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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

COOPERATION AMONG AMERICAN GEOGRAPHICAL SOCIETIES.*

IN considering the many ways in which the science having as its special province the study of the earth's surface can be enhanced and its service to mankind rendered more efficient through the agency of geographical societies, five subordinate themes present themselves for consideration. These are: The scope and aim of geography; the methods of gathering and distributing geographical knowledge; the functions of geographical societies; the present status of the geographical societies in America; and in what ways can the geographical societies of this country increase their influence and enlarge their usefulness?

THE SCOPE AND AIM OF GEOGRAPHY.

The proportions of a great mountain seem to vary according to the point of view of the beholder, and the impressions it makes on various minds also vary, as may be said, in reference to their sensitiveness to thought-waves of different length. To the dweller in a vale at a mountain's base, its sublime slopes do not present the same picture that is beheld by the traveler on a neighboring plain; the impressions its weathered battlements awaken in the mind of the untutored savage have but a faint resemblance to the train of thought started

* Address of the vice-president and chairman of Section E—Geology and Geography, Philadelphia, December, 1904.

into activity by the same stimulus in the brain of the geographer. When the name of the mountain is spoken, all of its attributes and all of its subjective influences may be conceived as being embodied in the word used.

In a similar way the word *geography* has many shades of meaning, according to the point of view and the training of the person using it. To the child at school, to the poet, the painter, the man of affairs, the scientific geographer, etc., the word does not have the same significance, and, in fact, in the different connections just suggested, might be thought to refer to widely different subject-matter. To some persons the mountain of earth-lore is far distant—a mere cloud on the horizon—while to other persons it is near at hand, overshadowing in its immensity, awe-inspiring in its magnificence, and its rugged slopes inscribed with the history of ages, while its summit is veiled from view in the cloud-land of the unknown.

The multiple interpretations that may be given to the word geography demand attention, but in order to learn the scope and aim of geography as a science, we turn to the explorers and investigators who have aided in its development. Answers to the question: What is geography? by several of its learned expounders were summarized by Charles R. Dryer,* and a concrete definition extracted from them which reads: *Geography is the science which deals with the distribution of every feature and the environment of every creature on the face of the earth.* The meaning of this crystallized statement is more fully shown in the admirable address referred to by enumerating the several subordinate parts of which geography is the symmetrical whole. These are:

1. The earth as a planet: its form, dimensions, motions and relations to the sun.
2. The land: its outline and relief; the distribution of its surface forms, including streams and lakes.
3. The sea: its outline, depth and contents; the properties and movements of seawater.
4. The atmosphere: its properties, conditions and movements, and their results as manifested in climate.
5. Plants and animals; their distribution.
6. Man: the distribution and movements of peoples; human conditions, industries, structures and, to some extent, institutions.

While it is no doubt necessary to divide and subdivide the science of the cosmos, both for convenience of study and in order to bring the magnificent whole within the range of human comprehension, the rigid lines established for these and kindred purposes, it should always be remembered, are artificial and nearly always indefinite. There is no inter-science law, corresponding with international agreements, which fixes their bounds. Every student of nature must feel that he can visit his neighbor's fields without being considered a trespasser, and be at liberty to pluck the flowers of truth growing there without being branded a thief. From the hard, dry formulas cited above—although fully appreciating the logical plan for earth-study outlined by them—I would remove the implied limitations as to space and time and introduce perspective. Not only the study of the distribution of land and water, of plants and animals, etc., at the present day should be free to the geographer, but the many combinations of conditions and processes which have led to the present order of things should come within the range of his vision. The 'life history' of every feature of the earth's surface, and the 'life-work' of every process by which those features have been fashioned, together with the

* Charles R. Dryer, 'What is Geography?' An address before the Southern Illinois Educational Council at Carbondale, October 23, 1903, *Teachers' Journal*, Marion, Ind.

changes still in progress, as well as glimpses into the future, are to be numbered among the fascinating problems geography has to present. To the study of the earth's surface may well be added the light, color and motions which give that surface its beauty and variety. I would have the geographer feel that the thoughts of a poet greater than Milton, who 'with no middle flight intends to soar,' are interwoven with the bare statement that the study of earth includes its form, dimensions, motions and relation to the sun. The picture these words outline in the mind reveals a mighty globe, without visible support, revolving in space, and an orderly ebb and flow of its surface waters, in obedience to the same intangible power of gravity; the silent daily change from light to shadow; the pulse-beat of the seasons; the advance and retreat of secular changes in each of these orderly revolutions—all this and more, so magnificent and so inspiring that it can scarce be thought, much less spoken, is by inheritance the right of the geographer and should not be denied him. The earth, like the wayside flower, has a life history, and a search for the records of its birth and growth is of interest to the geographer, even if not included in the strict time limits granted him, and he should have freedom to follow his thoughts wherever they lead. Nor is this all; the geographer who no middle course intends to take, must reach out for the sun and all his attending planets, and search the realm of distant space for meteors, nebulæ, star-clusters and cosmic mists, which in any way may aid in interpreting the story of the earth's evolution. So also in the study of the land, the sea, the atmosphere, and the relation of these to life, and to human history, I would bid the geographer remember that the earth's surface is not fixed and rigid, a dead, motionless thing, but ever changing in response perhaps to the fall of a raindrop or an eruption of Krakatoa, and that it is clothed with beauty of both form and color, and whispers with a thousand tongues to the admirer who inclines a listening ear.

What then is geography? The study of the distribution of earth features and of the environment of living things, to be sure, but also the reading of the fascinating story of the development of those features, and a search for the complex antecedent conditions which gave birth to the present marvelously delicate adjustment of life to its environment. Illuminating this temple not made by hands are pictures of the earth-beautiful, and the many charms that are imparted to nature-study by all that is lovely in form and color, and fascinating by reason of sound or motion on the still developing earth's surface with which man's life is linked and of which his body is a part.

GATHERING AND DISTRIBUTING GEOGRAPHICAL KNOWLEDGE.

The chief aim of the geographer being to gain all possible knowledge of the earth's surface as it exists to-day, and of the history of the changes which resulted in the present order of things, the question presents itself: How is this knowledge to be acquired, and what is to be done with the harvest when reaped?

The popular idea in reference to methods of acquiring geographical knowledge is, no doubt, to traverse unknown lands, make voyages in Arctic and Antarctic seas, and scale mountains never before pressed by human foot. Such enterprises, however, although laudable and commendable in themselves, can not be considered as the most noble or most fruitful of geographical explorations. Geographical advances are to be made not only by crossing ice-fields and climbing mountains, but by excursions into the realm of ideas as well. A modern phase of the science consists in tracing the

successive changes various features of the earth's surface have passed through, and in noting the orderly sequence of events produced by the moving agencies still active in modifying and molding the earth's features. This search culminates in the study of the relation of life, and particularly of man to surrounding physical conditions. While the explorer of new lands gathers facts, the philosophical geographer arranges those facts in orderly sequence, interprets their meaning and deduces from them hypotheses, which have for their purpose the discovery of the laws of nature. It is the formulating and elucidating of these laws which constitutes the noblest aim of geographical science. This philosophical stage in the growth of geography has but recently been entered upon, and is the one which is to claim the greatest share of attention in the future.

From this as yet not generally recognized point of view, it appears that fresh fields for exploration surround us on every hand. Some of the most important advances in geography yet made can be claimed as the fruits of home study rather than resulting from explorations in new lands, although based on and supported by extensive field investigations.

Illustrations of this thesis are: the base-level idea, which was given concrete shape and stamped with a name by Powell, the important principle embodied in the term geographical cycle, coined by Davis, and the laws of stream erosion, transportation and deposition so admirably formulated by Gilbert. These and other far-reaching and, as it seems, universal and everlasting doctrines render transparent the clouds which before shadowed familiar scenes and impart to them new significance. The lands to be explored by the scientific geographer encompass us on every hand, and the sea has only just begun to yield up its secrets.

The gaining of geographical knowledge at first hand, or geographical research, consists, then, of both journeying and thinking, and the two are inseparable in order to secure the highest results.

To the question: What is to be done with the fruits of geographical studies when gathered? I could answer curtly: Give them away. Sow the seeds of knowledge broadcast in the minds of men, with faith that some of them will germinate there and multiply a thousandfold. In the harvest of the future, as we may be assured from the principle termed mutation by biologists, every seed will not have reproduced its kind, but new species will appear and rank among the discoveries of the future.

As to methods of geographical research pertaining to individuals, or combinations of individuals, as in organized expeditions or surveys, and the various ways of publishing the results of such undertakings, attention is here invited to only one phase, namely:

THE FUNCTIONS OF GEOGRAPHICAL SOCIETIES.

Aids to Exploration and Research.—As shown by the histories of geographical societies and most prominently by the records of the Royal Geographical Society of London, the mother of them all, they have been most sympathetic to the adventurer and explorer, and have aided in many instances not only directly from their treasuries, but perhaps still more efficiently through their influence on legislation, in starting individual travelers on their way and equipping exploring expeditions. Incident to such direct material aid have been more or less successful attempts to train explorers for this work and furnish them with instructions as to ways of conducting it. The word 'unexplored' has not as yet been erased from our globes, and many mountain peaks are as yet unconquered; the privilege of assisting in such tasks is

still open to geographical societies, and by some persons may even now be considered as the chief aim they should have in view.

With the change from traversing unknown areas to exploring the domain of ideas, which made geography a science, the sphere of usefulness of the geographical society has been vastly enlarged and new duties placed upon it. Thus far, however, geographical societies do not seem to have awakened to the full realization of the dignity of this new life, and the vast possibilities it opens for their own growth and elevation. It needs no argument to show that it is a duty of a society having the study of the earth's surface for its chosen field, to foster and encourage geographical research in the laboratory and library, in cultivated fields, and amid hills and valleys, just as truly as it is to aid the African explorer or encourage the mountaineer who would scale Mount Everest.

To be reckoned among the functions of geographical societies, is the search for the exceptional man, not only he of strength of limb who can climb mountains, and of great endurance who can brave the perils of ice-fields or tropical jungles, but the man of broad philosophical ideas and logical mind, who can correlate the facts explorers gather, supplement them by his own field-studies, and deduce from them the laws that have governed the earth's development and still control the winds, the streams, the glaciers and other agencies by which the earth's surface is being modified and changed.

The corner-stone of every geographical society should, therefore, be geographical research, under which term systematic endeavor to enhance any branch of geographical knowledge is included.

Diffusion of Geographical Knowledge.—While an increase in knowledge should be the leading ambition of geographical societies, their greatest activity and chief exertion, as shown by their histories, has been in the direction of spreading or disseminating knowledge already acquired. Activity in this direction is highly commendable and should be encouraged, as it is a most important function; but it is an outcome of research and occupies a lower plane. The means for disseminating knowledge available for geographical societies, as is well known, are: Both popular and scientific meetings, public lectures, field excursions, joint sessions of two or more societies, international congresses, together with the printing and distributing of journals, proceedings, magazines, etc.

Intimately connected with the distribution of a special kind of knowledge from a given center, is the gathering together at that center the records pertaining to the specific aim in view distributed from other centers. One function of a geographical society is, therefore, to maintain libraries of books, maps, charts, and, also, in these later days, of photographs. Necessitated by this and other functions is the ownership or control of a building suitable for library purposes, places of meeting, etc.

Individual Conferences.—All the functions of geographical societies have not been stated, however, when the aids they offer to exploration and study, and their various means of publication are reviewed. There is an important and wide-reaching influence which results from the personal contact and friendly exchange of ideas and experiences between persons engaged in the same or similar lines of work. It is seemingly this phase of the social instinct of mankind, more than any other element in scientific cooperation, which leads to the organizing of geographical societies, and serves to hold their members to a common purpose. The importance and value of the contact of man with man, while dependent mainly on the personalities, breadth of experience and richness of

ideas of the men themselves, also influenced in a favorable way by an increase in the number, and a widening of the geographical range, of the persons of the same cult who are thus affiliated. In general, it may be said of the gatherings of geographers, and of those interested in their work, that the good resulting increases in more than a simple ratio with increase in numbers and with a broadening of habitat. The trustworthiness of these statements finds support in the success of the several international geographical congresses that have been held, and is illustrated by the results of the recent International Congress of Arts and Science assembled at the Universal Exposition at St. Louis.

Awakening Interest in Geography.—Still another important function of geographical societies is the influence they exert in awakening and stimulating interest concerning the wonders and beauties of the earth in the minds of the people forming the communities where they are located. By thus catering to the curiosity of people they may be led to inquire more closely into the aims of geographers. This function is analogous to the process of creating a demand in the commercial world, and is not beneath the dignity of a geographical society. Agencies in this direction and exhibitions of maps, photographs, etc., of countries on which public attention is centered, be it South Africa or Manchuria; collections illustrating the industries of such countries, or a similar gathering together of antiquities, etc. The most common of such exhibits is the placing on the platform at a popular gathering, of an explorer or traveler, who, it may be whispered in some instances, awakens greater curiosity personally than for the additions he has made to geography.

Influence on Legislation.—Among the functions of geographical societies is also included the influence they exert or should possess in reference to advising legislative bodies concerning the aid they are asked to extend to expeditions, surveys and research along various geographic lines, in order that public funds available for such purposes may be wisely expended. The recognition of the public importance of several European geographical societies is expressed in their names. One of the functions of the National Academy of Sciences of the United States, in which geography is represented, is to advise congress in reference to scientific matters which have a bearing on legislation or demand legislative enactments. Geographical societies, however, which have no organic connection with governments, may influence their action and lead them to foster and promote geographical work, either directly by means of petitions, or indirectly through the personal exertions of their members, as well as by means of the public press, and in other ways. In the exercise of this function also, large membership and an extensive habitat, greatly enhance the good a geographical society can do, and increases in more than a simple ratio with increase in its membership and the breadth of the region from which its members are recruited.

To summarize: The principal functions of geographical societies are: The encouragement of exploration and research; the holding of meetings for the presentation of information on geographical matters, and eliciting discussion; public lectures; field excursions, etc.; publication of instructive geographical reports, essays, maps, etc.; maintenance of libraries; facilitating personal conferences between men engaged in like explorations or investigations; the stimulating of public interest in matters geographical; and the education of legislators as to the relation of geography to human advancement. Even this

suggestive summary does not exhaust the subject in hand; the recognition of work well done, as when a geographical society bestows a medal on an explorer; the assumption of the duties of an executor, as when such a society administers a legacy; the opening of halls for the exhibition of loan collections of various kinds, etc., show that the functions of geographical societies are still wider and more varied than can be discussed at this time.

In connection with this summary, I desire to emphasize the fact, as has already been done in part, that in the exercise of several, if not all its functions, the power of a geographical society to do good and enhance the welfare of mankind increases both with the growth of its ideals and with its increase in numbers.

That the importance and influence of such a society of necessity increase with the lengthening of its roll of members may not be true, but as even the laymen in a society have expressed by the act of becoming members their interest in the ideals for which it stands, and furnish the principal part of the audience to which its professional members address their talks and writings, they furnishing a desirable means for disseminating knowledge, and in this, if in no other way, aid in the fulfilment of the tasks geographical societies undertake. The mere fact that persons interested in geography unite to form societies is, in itself, evidence that by means of such cooperation something is gained which is denied the isolated individual, and so far as experience suggests there is no upper limit to the number that can to advantage unite their efforts in this manner.

THE PRESENT STATUS OF GEOGRAPHICAL SOCIETIES IN NORTH AMERICA.

The leading functions of geographical societies being, as all persons will, I think, concede, the increase and diffusion of geographical knowledge, the inquiry comes home to us: How well are the geographical societies of America fulfilling the purposes for which they exist?

After considerable exploration—analogous to that involved in traversing a new land—but greatly assisted by a recently published paper on the 'Geographical Societies of America,' by J. Paul Goode,* I find that in North America at the present time there are not less than seventeen societies, associations and clubs which have geography in some form as the chief bond which unites their members. A list of these several organizations, together with certain data concerning them, is presented on the next page.

The distribution of these societies, as is indicated in the table, includes in an east and west direction, Boston and San Francisco, and its range in latitude is from Washington to Quebec on the east, and from San Francisco to Seattle on the west. In view of the fact that geography is concerned with the distribution and environment of living things, the narrow belt as measured in latitude inhabited by our geographical societies is suggestive. What are the climatic and other conditions peculiar to this belt of nine degrees, which make it prolific in geographical societies, while the vast region to the north and a nearly equal extent of land to the south are barren in this particular?

Of the organizations referred to, there are perhaps ten which, as declared by their constitution and made evident by their work, can reasonably claim recognition as geographical societies; the remainder are of the nature of social clubs, with geographical features, rather than societies having for their leading aim an earnest de-

* *The Journal of Geography*, Vol. II., 1903, pp. 343–350; Vol. III., 1904, p. 44.

† Quoted from the article by J. Paul Goode, cited above.

LIST OF GEOGRAPHICAL SOCIETIES.

Name.	Location.	Number of Active Members.	Books and Maps in Library.	Annual Dues.	Initiation Fee.	Life Membership.
Alaska Geographical Society†	Seattle.	1,200?		$2.00		
American Alpine Club	(Organization incomplete.)			5.00		
American Climatological Association		140		7.50	$1.00	
American Geographical Society	New York.	1,300	40,000 books. 12,000 maps.	10.00		$100.00
Appalachian Mountain Club	Boston.	1,500	2,000 books. 1,500 maps.	4.00	4.00	50.00
Explorer's Club	New York. (Organization incomplete.)					
Geographical Society of Baltimore†	Baltimore.	1,725		1.00		
Geographical Society of California	San Francisco.	?		5.00		100.00
Geographical Society of Chicago	Chicago.	65		2.00		25.00
Geographical Society of the Pacific	San Francisco.	?	4,822 books. 274 maps.	6.00		100.00
Geographical Society of Philadelphia	Philadelphia.	537	900 books.	5.00		50.00
Harvard Travelers' Club	Cambridge, Mass.	140		2.00	5.00	25.00
Mazama Mountain Club	Portland, Ore.	100	100 books. 50 maps.	2.00		25.00
National Geographic Society	Washington.	3,375	1,500 books.	2.00		50.00
Pele Club	(Organization incomplete)					
Quebec Geographical Society †	Quebec.	200				
Sierra Club	San Francisco.	760		3.00		50.00

sire to increase and diffuse geographical knowledge. The combined active membership of what may be termed *bona fide* geographical societies is over nine thousand. This number in itself is significant of a wide popular interest in geographical matters, particularly among the people of the United States. The condition next in importance to interest in geography, which leads to the organization of geographical societies, is evidently concentration of population. Each of our geographical societies has its home in a large city. It is probable, however, that there are many, many thousands of people outside the cities in which the societies referred to are located, who would join similar organizations if it were practicable for them to attend their meetings. In planning for the extension of geographical societies in the future this great but widely scattered demand needs to receive serious attention.

As is no doubt familiar to most of my readers, our geographical societies have extended important aid to exploration, and in the case of at least two societies, namely, the American Geographical Society and the National Geographic Society, the record in this respect is an honorable one.

In reference to aid extended to geographical research, when not directly associated with or forming a part of the work of an expedition, I have inquired in vain for evidence that our societies have either expended money directly or by awarding medals or by other similar means recognized the labor of those who have striven diligently and successfully to explore the domain of philosophical geography.* Here again an extensive field for enlarging the usefulness of our societies makes itself

* An exception should here be made in recognition of the Elisha Hunt Haner Medal of the Geographical Society of Philadelphia, founded 'for encouragement of geographical research.'

manifest. As shown by a considerable body of evidence that has been gathered, and as is a matter of current knowledge, the greatest efforts our societies have made have been in the direction of disseminating geographical information and attracting popular attention to the results explorers and travelers have brought home. During the year 1903 our geographical societies, clubs, etc., held a total of over 60 home meetings, in part scientific and in part popular; conducted not less than 44 public lectures, and engaged in about 16 field meetings. In addition to these direct methods of spreading information, mostly by addresses and lectures, our societies publish on an average approximating 2,000 octavo pages of printed matter each year. These statistics certainly make a favorable showing, and furnish hopeful signs by which to judge of the possibilities of the future.

The net results just referred to, however, pertain to quantity, not quality. The quality of the work our geographical societies are doing is difficult of even approximate determination, since there is no generally accepted standard of measurement available. This is also a delicate matter to discuss, for the reason that local pride and personal ambition are involved. Certain general conclusions, in this connection, however, seem too evident to be in danger of challenge.

The quality of a popular lecture may be said to be good, when its theme is entertaining and instructive, its presentation clear and forceful, and so adjusted to the audience addressed as to hold its attention and lead to logical and consecutive thought concerning the ideas presented. Since a popular lecture has for its principal aim the dissemination of knowledge, its success depends in a large measure on the number of persons who hear it. Judged from this composite standard, the lectures delivered under the auspices of our geographical societies must in general be adjudged good and their influence wide reaching.

The quality of a scientific session of a geographical society for the purpose of presenting and discussing the results of exploration or the conclusions obtained by painstaking research, may be said to be good when the subject-matter is a contribution to previous knowledge. Added to this quality there should be intelligent and suggestive discussion, bringing to the front various points of view, and showing incidentally whether or not the principal speakers have presented their ideas clearly and logically. The success of a scientific meeting is also to be judged, to a considerable extent at least, by the number of persons in attendance, since one aim, and in general the main desire, is the diffusion of knowledge. Judged by these standards the meetings of our geographical societies must be accredited with having added important truths to the world's store of knowledge and to have exerted a beneficent influence on thought and methods of thinking. In large part, however, the degree of success in the case of the meetings in question has been less than could have been desired, owing to the small measure of encouragement extended by our geographical societies to research, lack of adequate preparation on the part of the audience, and as an element necessary to the dissemination of knowledge, the smallness of the assemblies usually in attendance when questions bearing on scientific geography are discussed.

Success in the case of the publications of geographical societies lies mainly in two directions, one the importance of the additions made to knowledge, and the other the extent to which knowledge is distributed. The pages printed are in the main either popular or scientific, but the highest ideal, as I think may justly be claimed, is at-

tained when both of these properties are combined in an individual production. Enhancing the value and usefulness of the publications referred to is their degree of perfection as books, the facility with which they can be had for reading or reference, and the wideness of their distribution.

Turning to the publications of our geographic societies with these ideas in mind, we find less ground for congratulation than in reference to the lectures and the meetings held under their auspices. Without attempting to illustrate by specific examples, it can, I think, be claimed by an impartial critic that the publications of our geographical societies, when judged as attempts to popularize geographical knowledge, in general lack literary merit, are merely descriptive and do not consistently and with subtlety of purpose lead the reader on to think for himself. As contributions to geographical research the publications referred to clearly contain a few papers that are direct and first-hand additions to science, but the number of such papers is few. Our leaders in geographical research do not as a rule seem to consider the publications of our geographical societies favorable places for putting their results on record.

In reference to the publications under consideration, as specimens of the bookmakers' art, they, as a rule, fall below the standard of the better class of literary magazines. Their appearance is in general not attractive, the illustrations in many instances have not been wisely chosen, and, in general, have been poorly reproduced.

As to the distribution and accessibility to the publications under consideration, it is evident that they are not widely known, and although exchanged with scientific societies in this and other lands, they do not find their way into public, collegiate and private libraries to the extent that could be wished. In part, this lack of what may be termed efficiency comes from the comparatively large number of journals, magazines, proceedings, etc., issued, the lack of demand for the kind of information they contain, and the fact that they are too weak to win their way and attract readers in the face of the competition of scientific writings printed in more attractive and convenient forms. In brief, the efforts of our geographical societies in the direction of publication are widely scattered, in large part the bulletins, etc., issued appear at irregular intervals, are repellant rather than attractive in dress, and in large part are weak when considered as either literary or scientific productions, and do not attain the standard that may reasonably be demanded.

As a summary of the defects of our present system I venture to insist that our geographical societies are not only lacking in unity of purpose, but are antagonistic rather than cooperative. Their influence in each case is local, and their aims narrow and ill defined. In no case has research, the true foundation of geography as a science, been made a prominent feature, and never, so far as I have been able to learn, has it received direct financial aid or popular recognition. Owing to the local character of the societies in question and the narrowness of their respective habitats, the facilities they furnish for men to become acquainted with their fellow workers are much less than could be desired. But the most glaring failures are evident in the general weakness of the publications issued, and the inefficiency of the means employed for their distribution.

This unsatisfactory but perhaps somewhat biased summary brings me to the last subdivision of my theme, namely, the inquiry—

HOW CAN THE EFFICIENCY OF OUR GEOGRAPHICAL SOCIETIES BE ENHANCED?

The chief defects in the present status of our geographical societies being as it appears lack of cooperation, low standards in reference to geographical research and inefficiency in publication, efforts at improvement should be mainly in these directions.

The proposition has been made that by organizing a strictly scientific society with geographical or, as it seems, more precisely physiographical research as its chief aim, membership to be restricted to what may be termed professional geographers, all that can be hoped for in the direction of assisting in the study of the earth's surface in this country by means of such cooperation might be attained. It is at once apparent, however, that such a course would be the adding of one more to the already long list of American geographical societies, thus tending not only to render still more diffuse the amount of energy available for geographical work, but to eliminate the more advanced students of geography from the existing geographical societies, and thus deprive them of the leaven, as it were, which is essential to their progress. The new society having research for its chief end, could not be expected to make exertions in the direction of popularizing geography, and thus aiding in the diffusion of geographical knowledge, which is the chief purpose of many of our existing geographical societies. It can be reasonably claimed, I think, that a geographical society will attain the largest measure of success when it carries on the work of adding to geographical knowledge and the task of popularizing and distributing such knowledge at the same time, as one branch of the operation assists and stimulates the other. Then, too, the proposed society, having research in geography as its chief function, and not being open to non-professional geographers, would, of necessity, be small in numbers, and the expense of maintaining it would fall entirely on geographical investigators whose financial resources, as is generally understood, are meager.

It may also be mentioned in the above connection that the Geological Society of America welcomes technical papers pertaining to most geographical subjects, and will give them a place in its bulletin. Similar courtesies are also freely extended by *The Journal of Geology* and several other scientific periodicals. This greatly lessens the demands of skilled geographers for opportunities to make their results known.

Another plan which contemplates the reorganization of our geographical societies, providing it can be satisfactorily adjusted to the interests of all concerned, has for its chief feature the union of all the geographical societies of North America with the oldest in the list, namely, the American Geographical Society. Under this plan each society effecting such a union would become a chapter of the home society, but retain its own organization and its own property, but unite with the parent society in holding annual meetings and in publishing a monthly magazine. This plan has many commendable features when followed out in detail, and differs but little in its aims from the alternative plan proposed below. The general bearings of each of these schemes for enhancing the welfare of our geographical science will be considered later.

The alternative plan just mentioned is for the several geographical societies now in existence, and such other similar societies as may be organized in North America, while retaining their individual names and autonomy, to unite in a brotherhood of societies to be designated by some appropriate name, as, for example, *The League of American Geographical Societies*, which should provide for one general meeting or congress each year, at such centers of geo-

graphical interest as may be decided on, and assume the duty for publishing for all of the affiliated societies. Suggestions more in detail which point the way for securing such cooperation are here presented, it being understood that the first step would be the holding of a convention, at which representatives of each society which might desire to join the league should be present and assist in framing a constitution and by-laws.

A preliminary plan for the organization of such a league as just suggested can at least be outlined at the present time and be made a subject for discussion.

Let the president of each affiliated society be *ex officio* a vice-president of the league. Let each affiliated society elect a member of the council of the league for each 500 of its members in excess of 1,000. Such councilors, together with the vice-presidents, to elect each year a president, secretary, editor and treasurer from the members of the affiliated societies not of their own number. The president, vice-presidents, secretary and elected councilors to constitute an executive council for transacting all business relating to the management of the league.

The functions of the league would be the holding of an annual congress open to all the members of the affiliated societies for the purpose of reading and discussing papers, etc., and the publishing of a monthly magazine or other journal to take the place of the publications previously issued by the several affiliated societies. The expense of each annual congress to be borne by the members in attendance, and the cost of the magazine to be shared by the affiliated societies in proportion to their active membership.

The executive council referred to should have the power to receive into the league additional societies as it sees fit, and to arrange for the enrollment of members who are not on the list of any affiliated society.

Under either of the plans just proposed, namely, a union of various societies in one American geographical society, or a league of societies, the leading advantages to be expected are such as would flow from, (1) an annual congress of American geographers in addition to our present local meetings, and (2) concentration of publications.

1. The advantage of an annual congress, as may be predicted, would be large audiences with wide geographical representation, favorable opportunities for personal conferences and the cementation of friendships, and the encouragement that large and representative gatherings would extend to explorers and investigators to present the best fruits of their labors. To these gains should be added the stimulus such a congress would have in the home cities of the affiliated societies, at which sessions would be held, thus tending each year in an important way to extend the influence and enlarge the membership of some one local society. The greater influence on legislation to be expected from the combined voices of many societies over the efforts of any single, local society, suggests a practically new field of usefulness to the geographers of America.

The chief objections that arise in reference to holding an annual congress of American geographers are two in number: First, the large number of similar meetings now held each year, with which many geographers are more or less closely identified. Whether it is desirable to endeavor to promote still farther this plan of scientific development is indeed a serious question, and one that calls for discussion. The second objection is, that owing to the wide geographical distribution of our geographical societies, the proposed annual meetings would be but meagerly attended by the members of the affiliated societies located at a distance from the chosen places of

meeting. Owing to the conditions existing, there would no doubt be a tendency to divide the annual congress into two sections, as has been done in the case of the Geological Society of America; one to hold its meetings on the Pacific and the other on the Atlantic coast. Such a division would lessen the influences for good, for which the congress would be organized, and demands careful consideration.

2. The gains to be expected from a concentration of publications are, to a marked degree, expressed by the fact that the proposed magazine, in case all of our geographical societies united in its support, would start with a circulation in excess of ten thousand, not including libraries or subscribers not members of the affiliated societies. With such a vigorous start rapid growth and a constantly widening influence for many years to come may reasonably be predicted. In the list of advantages is to be mentioned also the desirability of having a large body of correlated information in one series of volumes, instead of in many series, thus securing ready reference, and conferring a blessing on future generations of geographical workers. Perhaps the greatest gain to be hoped for, however, is in the direction of a higher tone and better preparation, that a widely recognized, well edited, well printed and well illustrated magazine would have over the for the most part obscure and indifferently printed proceedings, journals, magazines, bulletins, etc., now issued. Another and important advantage which the proposed magazine would have over several of the publications which it would replace, would be the securing of the services of a competent editor, who should receive adequate compensation for his labor. Again, it may reasonably be expected that an attractive geographical magazine would replace to a considerable extent the popular literary magazines of to-day, and secure a large number of readers outside of the societies from which it derived its main support. A magazine having for its aim the diffusion of all branches of geographical knowledge would be welcomed by tens of thousands of our school teachers and other intelligent people in isolated communities who are debarred from oral instruction by leaders in geographical exploration and research.

In reference to the financial aspect of the proposed scheme, it seems self-evident that at least as great a sum of good as is now attained could be secured at less expense, since duplication of reviews, news items, lists of new books, maps, etc., and, to a considerable extent, of matter contained in leading articles, could be avoided; and, also, because one editor would take the place of several editors. Again, the new magazine, by having a wider circulation than any one, and, as may reasonably be expected, in excess of all the publications it would replace, would be enabled to secure an important revenue from advertisements.

One reason for the failure of our present geographical publications to secure a wide circulation outside the immediate members of the respective societies issuing them is, as it seems, lack of business management, coupled with the fact that the enterprise in hand in most instances is too small to be worth energetic exploiting. The publications referred to are not brought before the public in the manner in which literary magazines are promoted, or advertised in the various ways familiar to book publishers. With the proposed concentration of publications there would also be a concentration of effort in the direction of marketing the products of the several affiliated societies, which all persons interested in the matter must agree could not fail to be far more efficient than the present method, or rather want of method, in that direction.

In this connection, it may be suggested that some plan for having the proposed magazine issued by an influential publishing house demands careful consideration.

An objector to the proposed plan of concentrating geographical publications may, perhaps, say that the standard of the new magazine with its world-wide field and high aims, would tend to discourage the modest student who has his maiden paper to present, and could not afford space for the ambitious amateur who desires to see his name in print. For one, I would meet these objections by admitting their truthfulness, but claim that in the end good would result. The new magazine should be under rigid censorship, in reference to the scientific quality and literary merit of the matter presented. While these safeguards would demand greater care and more serious effort than at present on the part of contributors, they would not debar any one whose work had merit, but serve rather to stimulate all geographers who desire to put the results of their labors on record to strive for high ideals.

From the point of view of the existing geographical societies, it may be claimed that they have developed in response to certain local demands, are adjusted to the conditions that gave them birth, and serve the communities in which they are located better than could be expected if they were more or less merged in a larger organization. Such contentions are no doubt true except perhaps as to the validity of the last clause. The proposed change does not require of any local society or club the obliteration of its individuality. Under the plan for uniting all or a large number of our local societies in one truly American geographical society, there would, of course, be a change of name. If a league were organized present names could be retained and simply another process of publication initiated. The aim in either case should be to maintain the individuality of each affiliated society, and an endeavor to make it if possible even better adapted to local needs than at present. An important aid in this direction (as already suggested) would result from the influence of the general meetings that would be held at the homes of the various chapters or affiliated societies. Such meetings, as may be judged from the history of the American Association for the Advancement of Science, would stimulate interest in the local chapters to a high degree.

Then, too, a strong, well written and well edited and well illustrated geographical magazine, by presenting a wide view of geography and of its many contacts with other interests, may reasonably be expected to exert a wider influence even in the home city of an affiliated society than any strictly home journal.

In addition to the richer harvest to be expected from an annual congress of American geographers and a jointly published magazine as just considered, earnest and active cooperation among our geographical societies, as may reasonably be expected from such concentration of energy, should lead to their taking the initiative in several other directions. Among such hopes of the future is the securing of a map of North America on a scale of 1/1,000,000, as a contribution to the map of the world in the completion of which certain European societies are interested. Another desirable undertaking would be the publication of detailed instructions for the use of travelers and others, as to how and what to observe, in reference especially to the securing of the best possible illustrations of the results of known physiographic processes, and the recording of facts which are likely to lead to the discovery of new laws. Again, time and money might well be expended in preparing and publishing a dictionary of

geographical terms; a bibliography of geographical literature; in assembling a library of photographs, particularly of regions where geographical changes are most active, and in yet other directions.

Beyond the immediate and individual interests of a geographical society, or, what is more strictly true, perhaps, in most instances, the personal ambitions of a few of the members of such a society, is the broader and nobler aim of increasing man's knowledge of his dwelling place, and of widely diffusing such knowledge. In order to cultivate this larger field, the local society may reasonably be asked to relinquish, if necessary, some of its local prerogatives and look for compensation in the general advance that would be facilitated thereby. Among such restrictions the fact is to be recognized that should a society cease to publish directly, its returns from an exchange of publications with other societies would cease. Compensation for such losses might perhaps be looked for in a decrease of expenses for editing and printing, and might be made good by placing all the 'exchanges' received in return for the proposed magazine in the custody of some one society and thus striving to maintain one complete geographical library, which could be consulted directly, or its books, maps, etc., loaned to individual students.

In proposing the application of modern business methods in the concentration of geographical factories, as our societies may be termed, I wish to direct attention to the fact that geography more than any other science is best adapted for the purpose of general or popular education. Added to the fascinations of exploration we now have the equally absorbing results of scientific physical geography, pertaining to the fields through which we walk, the brook whose murmurs have appealed to us since childhood, the waves that beat on the shore where we perhaps spend our vacations, and many other equally familiar scenes. The ability to read the history of the earth at first hand should be within the reach of every civilized man, woman and child. It is in order to secure to all the people in North America this means of public education, coupled with never ending pleasure and a constantly expanding mental horizon, that our geographical societies are asked to unite their efforts.

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SECTION E—GEOLOGY AND GEOGRAPHY.

GEOLOGY and geography together occupied a large share of the attention of the members of the American Association for the Advancement of Science at the third Philadelphia meeting of the association, which was held at the University of Pennsylvania, December 28–31, 1904. Section E, 'Geology and Geography,' of the association held its regular meeting on December 28, the principal feature of which was the address of the retiring vice-president, Professor Israel C. Russell, of Michigan University, on 'Cooperation among the American Geographical Societies. The following delegates were appointed to represent the societies named, in the consideration of Vice-President Russell's address: for the American Geographical Society, Cyrus C. Adams, of New York; for the Chicago Geographical Society, Professor J. P. Goode, of Chicago; for the American Climatological Association, Dr. W. F. R. Phillips, of Washington, and Dr. J. C. Wilson, of Philadelphia; for the American Alpine Club, Professor Angelo Heilprin, of Philadelphia; for the Harvard Travelers' Club, Professor W. M. Davis, of Cambridge; for Mazamas, Dr. T. Brook White, of Washington; for the Pelé Club, Professor Robert T. Hill, of New York.

The general program was introduced by

Professor A. P. Brigham, of Colgate University, with a paper on 'Early Interpretations of the Physiography of New York State,' in which were recounted some of the views expressed concerning physical features of the empire state in the early decades of the nineteenth century, and the years preceding. Among the travelers who placed themselves on record was Timothy Dwight, president of Yale College. He and others discussed the origin and retreat of Niagara Falls in ways that forcibly suggest views held to-day. In observing the waters of the Great Lakes and their connecting streams, the tendency toward grade and the base-level was recognized, though not of course in the terms or with the full consequences of modern doctrines. The gorge of the highlands, the deposits in the Hudson valley, and the features of Little Falls, received much notice, and the older writers were quite familiar with the extension of Lake Ontario which we now call Lake Iroquois. On the whole the prophecies of modern views are numerous and full of interest.

In a paper on 'The Menace to the Entrance of New York Harbor,' Professor Lewis M. Haupt discussed the projects which have been and are now being carried on by the general government for improving the channels of the Lower Bay. Up to 1886, the ruling depth on the bar was 23.3 feet at mean low water, which permitted the passage at high water of a vessel drawing 27 feet. At the meeting of the American Association at Buffalo in the summer of that year (1886), Professor Haupt read a paper on the method of improving this entrance by natural forces, but the government concluded, notwithstanding the unanimous report of one of its boards of engineers, to resort to dredging to create a 30-foot channel, 1,000 feet wide, which has been secured and maintained after the removal, up to October, 1891, of 4,875,079 cubic yards at a cost to date of $1,967,-111.82. These depths not meeting the requirements of the port, facilities are now being increased by the opening of the Ambrose channel, seven miles in length, crossing the central part of the bar, by dredging therefrom 42,500,000 cubic yards, provided it shall not cost more than $4,000,000, or less than ten cents per yard.

By means of charts covering a period of 125 years, it was shown that the inlet to Jamaica Bay has moved westwardly seven miles in that time and that the deposits which were formerly arrested in that bay have now drifted past and are rapidly approaching the outer scarp of the New York bar. This one bank of sand contains some 65,000,000 cubic yards, while, on the other flank, the spit at Sandy Hook has advanced about a mile and is now moving into the bay, where it deposits a half million yards on the point every year, to say nothing of the sand held in suspension and which has been removed by dredging. The great quantities of drift thus advancing steadily into the entrance are becoming a serious menace to the harbor.

The remedy which Professor Haupt proposes consists of a single reaction training wall extending along the southerly side of the Ambrose channel to concentrate the ebb currents and the arresting of the littoral drift which will so soon convert Coney Island and Manhattan Beach into interior lagoons. The cost of this work would be less than one half of the present contract which guarantees no channel, as it is filling up even where dredged far below the requisite depths.

Dr. J. W. Spencer, of Washington, D. C., submitted a communication on 'The Submarine Great Cañon of the Hudson River,' in which he collated the results of soundings which have been made during a period of more than a century, but especially those of the last forty years. Professor

J. D. Dana first recognized the submarine channel of the Hudson as evidence of late continental elevation. Lindenkohl first perceived the cañon-like character of the outer portion of the channel near the border of the continental shelf, where the channel suddenly becomes a gorge 2,400 feet deep in the submerged plain. Lindenkohl thought that the cañon was terminated by a bar, but Dr. Spencer has determined that no bar exists and that the cañon cuts through the edge of the continental bench about eight miles farther. It then widens to a valley which can be readily recognized for an additional twelve miles and to a depth of 9,000 feet at a distance of 71 miles from the head of the submarine channel near Sandy Hook. The cañon is double, the upper part being four miles wide while the inner, lower, more sinuous portion is less than two miles across. The period of great elevation, amounting to about 9,000 feet, coincides with that of the early pleistocene. Since that time there has been a subsidence to somewhat below the present level, followed by a re-elevation of 250 feet as seen by the shallow channels of the continental shelf. The region is now sinking at the rate of two feet a century and is undergoing other and less important changes.

In a second paper on 'The Improbability of Land in the Vicinity of the North Pole,' Dr. Spencer said in part:

When Dr. Nansen discovered the deep Polar Basin, sharply defined by a continental shelf, 300–350 miles wide, north of Siberia, with this continuing to Spitzbergen, situated in its very edge, it was proof that no land was to be expected rising out of the basin until the continental shelf on the American side should be reached. The broad Siberian shelf continues even north of Bering Straits, and there are soundings which suggest the location of its approximate border. Alaska encroaches upon this shelf apparently to near its border, thus reducing its breadth to probably 50 miles. Beyond into Beaufort Sea, the Mackenzie River empties by a fjord known to a depth of more than 1,140 feet and another from behind Bank's Land of 1,836 feet, not far from its own head far within the line of the islands. Among the islands another of the discovered fjords reaches to more than 2,400 feet. All of these features prove that the archipelago of high mountains is only a dissected plateau, now sunken and with drowned valleys between the islands, which valleys incise the continental shelf in such manner as to indicate that the shelf itself can not extend far beyond the outer line of the known islands. A sounding about 30 miles north of Grinnell Land, with a depth of 432 feet further suggests that the edge of the shelf is being approached, for the outer margin of this seems to be limited by a depth of about 300 feet beneath sea level. From these submarine topographic features, which are the very best guide, the author supposes that no important islands exist beyond the line of the known archipelago, and that the deep polar basin reaches for 300 or 350 miles from the pole, aproaching the American continental shelf north of Grinnell Land.

The formal sessions of Section E closed with the reading of the following papers by title in the absence of their authors: 'The Structure of the Central Great Plains,' by N. H. Darton; 'Typical Desert Deposits of Eastern Persia,' by E. Huntington; 'Interpretation of certain Laminated Glacial Clays, with Chronologic Deductions,' by C. P. Berkey; 'The Fossiliferous Beds of Sankaty Head, Nantucket, and Their Age,' by Myron L. Fuller; 'On the Jagersfontein Tiffany (Excelsior) Diamond, Weight 971¾ Carats,' by George F. Kunz; 'On Some Pegmatyte Veins of California,' by T. C. Hopkins; 'The Petrography of Belvidere Mountain, Vermont,'

by V. F. Marsters, and 'Evolution of some Devonic Spirifers,' by A. W. Grabau.

The sessions of the succeeding days of the general convention were given over to the Geological Society of America. The vice-president and chairman for section E for the next annual meeting of the association is Professor William North Rice, of Wesleyan University, Middletown, Conn. The secretary of the Philadelphia meeting holds over, by constitution.

Edmund Otis Hovey,
Secretary.

SECTION G—BOTANY.

During the recent meeting of this section at Philadelphia, the following items of business of public interest were transacted.

Professor C. R. Barnes, University of Chicago, Professor F. C. Newcombe, University of Michigan, Dr. D. T. MacDougal, New York Botanical Garden, Professor H. M. Richards, Barnard College, and Dr. Burton E. Livingston, University of Chicago, were appointed a committee to confer with a like committee from the Society of Official Agricultural Chemists on the meaning of the expression 'Plant Food.'

The council of the association appointed as delegates to the International Botanical Congress, to be held at Vienna during the coming summer, Professor C. R. Barnes, University of Chicago, Mr. C. L. Shear, U. S. Department of Agriculture, and Dr. H. C. Cowles, University of Chicago.

Dr. Erwin F. Smith, U. S. Department of Agriculture, was elected vice-president and chairman of this section for 1905.

A joint session was held with the Mycological Society on Friday afternoon.

The following are the abstracts of papers offered:

Stages in the Development of Sium cicutæfolium: George Harrison Shull.

There is great range of variation in the leaves of *Sium cicutafolium*, the first nepionic leaf being the most variable and the bracts in the region of the umbel least variable. The juvenile leaves and the senescent leaves, which have been interpreted as atavistic, are shown to disagree with each other in almost every particular. The only cases in which the ancestry of a species is definitely known indicate that whatever change of structure gives rise to new adult characters also results in changed juvenile and senescent characters. The relative simplicity of the juvenile and senescent leaves is due to physiological causes having no essential bearing on the phylogeny of the species. *Sium* is mesophytic, hydrophytic and xerophytic at different periods of its development and these structural differences are associated with, but appear to be independent of, their appropriate environmental conditions. They are not a direct effect of the environment, but are due to the peculiar mechanism of the protoplasm. Rejuvenescence is the process by which protoplasm is changed from the senescent to the juvenile condition. This may result through sexual reproduction or may be brought about in other ways. In *Sium* it occurs regularly in the lateral buds at the base of the stems and may, under special conditions, occur in any other vegetative bud or even in the flower buds. In passing from less complex to more complex leaves the new characters consist in incisions or indentations above the base of the leaf, so that, in pinnate leaves, the proximal pairs of leaflets are homologous, and other pairs which are of like order counted from the proximal pair are likewise homologous.

Alternation of Generations in Animals, from the View-point of a Botanist: Charles J. Chamberlin.

This is an attempt to show that the egg with its three polar bodies, and also the primary spermatocyte with the four spores

which it produces, constitute sexual generations comparable with the gametophytic generation in plants. The argument is based upon: (1) The gradual reduction of the gametophytic generation in plants with the gradually lessening interval between the reduction of chromosomes and the process of fertilization, and (2) upon the phenomena of chromatin reduction in both animals and plants.

The theory has no bearing whatever upon relationships and it does not contemplate any homologies between any organs of animals and plants.

Anatomy of Foliaceous Cotyledons: FRANCIS RAMALEY.

Foliaceous cotyledons occur in many species of dicotyledons, yet in form and structure they are never exactly like the true leaves of the same plant. Any cotyledon, however, which is of herbaceous texture and has a leaf-like form may be described as 'foliaceous.' The term is especially well applied to those cotyledons which increase greatly in size after leaving the seed and act as photosynthetic organs for a long time. In the many species of both temperate and tropical plants thus far studied certain rather constant differences between leaves and cotyledons have been noted. The lamina of the cotyledon has usually a looser palisade than the leaf; it has stomata on both surfaces even in those cases where the leaf has them only on the under side. Stomata are, however, not so closely placed as in the leaf. Vascular tissue is less well developed in the cotyledon, as may be easily seen by examination of cross-sections of cotyledon stalk and leaf petiole. In the former the bundles are smaller than in the latter, also fewer and differently arranged. Stereom is usually not developed in the cotyledon stalk.

The Botanical Institute at Buitenzorg: FRANCIS RAMALEY.

The Botanical Institute at Buitenzorg has the best facilities to be found anywhere for the study of tropical botany. Practically all the trees in the large garden are arranged according to plant families, so that it is possible to get, in a short time, a good idea of the members of any particular group. The similarity of the flora of Java to that of the American East Indies makes Buitenzorg especially attractive to our countrymen who expect to do botanical work in the Philippines. The excellent library, the well-equipped laboratory, and the large staff of investigators all go to make the place worth visiting. And more than this—the director, Dr. Treub, is anxious to have visitors to the gardens and does everything to make their work profitable to them. The botanist, no matter what his specialty, will find here always ready and at hand an abundance of material for observation and study. Probably nowhere else can he learn so much in so short a time.

Polyembryony in the Genus Pinus: J. W. T. DUVEL.

The occurrence is reported of two or more fully developed embryos in each of the following species of pines: *Pinus coulteri* Lamb., Coulter's pine; *flexilis* James, limber pine; *jeffreyi* 'Oreg. Com.,' Jeffrey pine; *lambertiana* Dangl., sugar pine; *murrayana* 'Oreg. Com.,' lodgepole pine; *ponderosa* Laws., bull pine; *radiata* Don., Monterey pine; *rigida* Mill., pitch pine.

Observations on the Teratology of the Pine-apple: MEL T. COOK.

The term 'teratology' is used with a very indefinite meaning. It is very probable that a careful study of teratology will be of some service in taxonomy and morphology. Thirteen types of variation on the smooth 'cayenne' variety described. Many have been caused by the character of the

stock, the method of cultivation or the character of the fertilizer.

The Development of the Microspores of Vallisneria spiralis: Robert Bradford Wylie.

The staminate flowers of *Vallisneria spiralis* are borne in clusters, each containing often as many as two thousand flowers surrounded by a spathe. This group of flowers crowded upon the short conical axis is homologous with the single pistillate flower found within its spathe. The individual flowers are very small, simple, and contain usually less than one hundred pollen grains. The staminate flower may therefore be considered as a polien carrier since the microspores are not shed, but are lost to the stigmas by the pollen producing flowers. In their development the upper flowers on the axis develop earlier than do the lower ones; the terminal one is conspicuously more advanced than those adjacent to it. The mature flower always shows four pollen sacs, but a study of their devlopment shows that each of these may arise from a single sporangium or by the fusion of two sporangia. It follows that the single (?) stamen may have from four to eight sporangia; the number seems to vary indifferently even in flowers of the same cluster. The microspores have a single coat which is thin and slightly spinous. The male cells are developed while the spores are still in the sporangium. The male structures clearly show their morphology as cells rather than as nuclei only, and remain joined end to end while in the pollen grain.

Note on the Morphology of the Cyperaceæ: Amon B. Plowman.

Queva, in his study of the anatomy of certain monocotyledons (Lille, Travaux & Memoires, No. 22, 1899), has described the occurrence of concentric or amphivasal fibro-vascular bundles in the nodes of *Gloriosa,* and has concluded that these bundles are the result of the anastomotic conditions attending the transition of the bundles from the main axis to the axillary branch. Among the Cyperaceæ it has been found that amphivasal bundles occur in practically all nodes of plants bearing well-developed leaves, whether branches are produced or not; while, on the other hand, in those forms of which the leaves are rudimentary, no amphivasal bundles are present, even in nodes where branches of considerable size are given off. Hence it appears that the occurrence of amphivasal bundles in this group is related to foliar rather than to ramular differentiation of the stelar structures.

Dictamuus Albus L. (D. Fraxinella Pers.), Gas Plant: W. J. Beal.

This is an herbaceous perennial of the rue family (Rutaceæ).

The pistil is compound, deeply lobed, consisting of five carpels, each containing two to three seeds, 'each carpel, when ripe, splitting into two valves,' which divide into an outer and an inner layer. In other words, when mature, a considerable portion of the endocarp separates from the exocarp and at once each half begins to make the attempt to twist in opposite directions, much in the manner of the ripe half carpels of a vetch or pea. In this operation the half endocarps press the apical portion of the carpel wide open. A slight ridge on the inner edge of each margin of the carpel prevents for a time the escape of the twisting endocarp. The placenta separates into another thin trough-like piece, the margins of which are inside of the endocarp. The two seeds separate from the placenta, which sets loosely over the seeds, preventing them from falling out in case the branch bends down toward the ground. Seeds are torn off the placenta as this dries, shrinking away in the central portion and

lastly at the ends, which approach each other slightly. Each half endocarp resembles in a general way the capital letter J. The apical portion of the endocarp presses outward, while the basal portion tends to twist inward. When dry enough, and the carpel spreads open well, if the stems are jarred against each other by wind or animal, or the carpel pressed laterally or from each extremity, a sharp explosion follows as the half endocarps complete their twisting, thus liberating the thin placenta and throwing out the seeds. When left to themselves in a quiet place where there is no artificial pressure, the tension of the endocarp at length forces its way out, sometimes sending one or both seeds seventeen feet, possibly in some cases aided somewhat by the wind. Next to an examination of the parts as they develop, is to see models shaped like ripe pistils. The black, smooth seeds are nearly spherical, with a short neck. The seed is nearly 4.5 mm. long, by 3 mm. or more in transverse diameter. In size they are much like those of *Vicia sativa*.

The Value of the Diatoms in Determining the Direction of Ocean Currents and the Origin of Sea-bottoms: ALBERT MANN.

The investigation of the Diatomaceæ contained in the United States sea-dredgings and hydrographic soundings has brought out the fact that these organisms are a sure and the only sure index of the origin of sea-bottoms and incidentally of the extent and direction of sea-currents. This comes from four facts: (1) The indestructibility of diatom frustules, (2) their extreme minuteness, lightness and hence transportability, (3) their enormous numbers in genera and species, (4) the great differences between recent and fossil diatoms; between fresh-water and marine diatoms; between tropical, temperate and arctic diatoms. Illustrations of the foregoing facts from the dredgings and soundings examined; need of this work, especially in classifying and tabulating the characteristic diatoms of the different sea-bottoms.

Economic Methods in Restocking White Pine Forests: F. WM. RANE.

At present white pine lumber is getting scarce and hence its value is increasing. There is no lumber that can be depended upon to take its place and the economic problem of growing this tree for future lumber is deserving of much study and experimentation. This paper gives the data obtained from experiments in utilizing natural seedlings, showing that by their use much economy can be practised in restocking waste lands and in reconverting pine forests into new forest growth. By utilizing these seedlings, which at present have little or no value, the whole expense of restocking lands to forests can be accomplished at less expenditure than the original cost of the plants themselves when purchased from a nursery. Experiments outlined show that one thousand three-year-old seedlings can be dug and transplanted at a cost of one dollar and twenty-five cents a thousand. The nursery price varies with various sections and the quantity purchased, but it is safe to say that the first cost of seedlings from this source is much larger than the total expenditure of digging and setting in the former.

The Principles of Phytogeographical Nomenclature: PEHR OLSSON-SEFFER.

(1) Clearness and conciseness are the main requisites for a system of terminology. (2) Each technical term should have only one meaning. (3) In case of doubtful terms consult the proposer of the name. If the conception it represents is not absolutely clear, the name has no status in nomenclature. (4) If a term has been commonly used and understood in another sense than the original author proposed, it

should be retained, but only in case there can be no doubt as to its interpretation. (5) If a conception has already received a name and there is no obvious reason to discard that name, an author has no right to propose a new term. (6) A law of priority is practicable, we think, only so far as the principles laid down in the previous pages of this article will admit. (7) A name, the conception of which has materially changed in the course of time, naturally has no standing. (8) A technical term should be associated in our mind with the idea it represents. (9) A technical term should be clearly defined so as to leave no doubt as to its significance. Authors should, therefore, desist from proposing new terms in mere catalogues. (10) A new term should be published in some work accessible to scientific workers. (11) Vernacular names should not be excluded from phytogeographic nomenclature, but they must in every case be definite and give rise to no ambiguity. (12) An international committee of phytogeographers should be appointed by the Vienna congress, to continue the work on a proposed code of rules. (13) This committee should consider what kinds of technical terms are needed; how they should be classified, *f. i.*, with regard to distribution, abundance, elevation, phenological phenomena, etc. (14) The result of the work of the committee already existing, and of the succeeding one, should be published at an early date, so as to give the public ample time to discuss the various phases of the question before the following congress assembles.

The Cycadofilices: David White.

The 'cycadofilices' (Pteridospermeæ) comprise a group of Paleozoic fossil plant genera which, as the name implies, are intermediate between ferns and gymnosperms. The structure of the stems, roots and petioles shows a mingling of filical with cycadean characters; the fronds are typically filicoid, as also would seem to be the little-known microsporangia; but the seeds, definitely recognized in but three genera, appear to agree in their main features with the primitive (fossil) gymnosperms. The paper describes the more important or striking characters as yet discovered in these remarkable types, which, in general, antedated the cycads.

Suggestions from the Study of Dairy Fungi: Charles Thom.

The demands of certain economic problems emphasize the necessity of finding more certain and more uniform means of describing and determining common saprophytic fungi. The intimate connection between most of these problems and bacteriological questions suggests the desirability of seeking such methods of description in their physiological and morphological relations to well-known culture-methods and media. A dairy problem would indicate the methods of the dairy bacteriologist as to some extent necessary to make the work of practical value. Following these suggestions a series of dairy fungi have been cultivated upon such media through many generations. Certain species of *Penicillium* have been grown in hundreds of cultures to ascertain the comparative value of the observations made upon several substrata. In spite of wide variations on different substrata a remarkably constant series of characters have been secured which recur regularly upon the media used. These results suggested the utility of a diagrammatic summary upon the general plan used by the bacteriologists which should be useful for contrasting the characters of different species. The characters found of value in the genus *Penicillium* are reaction to litmus-media, liquefaction of gelatine, variations in color of colony, structures appearing at the margin of the rapidly growing colony, general surface effect of the colony, the relations of

the conidiphore and conidial fructification, the description of the conidia themselves, with occasional unique characters which identify special forms—such as the formation of sclerotia. Cultures, diagrams and card descriptions of species of *Penicillium* were presented to illustrate the characters mentioned.

The Asciferous Stage of Glœosporium Psidii: JOHN L. SHELDON.

By means of artificial cultures and inoculations, Dr. Sheldon was able to study the life-history of *Glœosporium Psidii* G. Del., a fungus which causes the 'mummy disease' of the guava. The *Glœosporium* stage of the fungus closely resembled the *Glœosporium* stage of the 'bitter-rot' fungus (Glomerella) of the apple as determined by himself and other investigators. In old cultures on apple-agar, masses of perithecia were produced which resembled those of *Glomerella* both in shape and in structure, and also in the size and shape of the ascospores. The results indicate that the two fungi may be identical, although there were certain characteristics of the two that were not quite the same. The investigation will be continued.

Cytological Studies of Sapromyces and Rhipidium: CYRUS A. KING.

Sapromyces and *Rhipidium* both belong to the Septomelaceæ, which family is placed by Schroeter in the Saprolegniineæ.

In zoospore formation the individuals are separated by the severing of connecting cytoplasmic meshes. This process begins on the interior if there is a vacuole present. In some cases, at least, there is an indirect nuclear division in the zoosporangium of *Sapromyces*. In the oogonia of *Sapromyces* there is one mitosis and there is probably one in *Rhipidium* also. In both forms during oogenesis the supernumerary nuclei migrate to the periphery where they are cut off in a periplasm. This periplasm in *Sapromyces* is very rudimentary. The fertilization tube in *Rhipidium* is of oogonial origin, although it is possibly of antheridial origin in *Sapromyces*. A conspicuous differentiated region corresponding to the oocentrum of Trow is seen in *Rhipidium*. The reticulations on the oospore wall of *Rhipidium* are probably homologous with the radiating walls between the peripheral cells of *Acosospora*. The structure of the oogonium and the processes in oogenesis show this group to be related to the Peronosporineæ and it is suggested that they be placed in this cohort as follows: Peronosporineæ—Albuginaceæ, Peronosporaceæ, Septomelaceæ, Saprolegniineæ—Saprolegniaceæ.

A Study of the North American Coleosporiaceæ: J. C. ARTHUR.

A list of twenty-four species is presented, some of them now described for the first time. The presentation chiefly deals with the method employed in discriminating between the species, their degree of relationship, and their distribution.

Nomenclatorial Type Specimens of Plant Species: A. S. HITCHCOCK.

In systematic botany there is an increasing tendency to base species upon definite specimens. Older authors did not do this. It becomes necessary to decide upon rules for selecting the specimen upon which species should be based when these are not definitely indicated. The present paper is a discussion of such rules.

Cultures of Wood-Inhabiting Fungi: PERLEY SPAULDING.

It has been found easier to make cultures of wood-rotting fungi from actively growing mycelium than from the spores. Agar made from infusions of the species of wood which the fungus is found upon, usually serve to start growth of the mycelium at first. They can then be transferred to tubes of sterilized green wood of the suit-

able species. Cultures of *Lenzites sepiaria* and *Schizophyllum commune* have yielded fruiting bodies, the latter in about five weeks' time. The spores of the former were germinated in a very weak cane sugar solution, but failed totally to germinate in water or in weak salt solutions. Inoculations with mycelium of *Lenzites* have given no parasitic action, but in cut timber they have produced fruiting bodies in less than five months.

The Effect of Climatic Conditions on the Vitality of Seeds: J. W. T. Duvel.

This paper is a preliminary report on experiments undertaken to determine the effect of climatic conditions on the vitality of seeds when stored in the ordinary seed packages and in air-tight containers.

In December, 1902, seeds were distributed to sixty stations throughout the United States, including Alaska, Hawaii, Porto Rico and the Philippines. In addition seeds were also stored in Newfoundland, Canada, Isle of Pines, Cuba, Jamaica, St. Kitts, Dominica, Barbados and Trinidad. At the expiration of six months and one year respectively two complete sets from each of the sixty stations were returned and tested for vitality. The results of the germination tests show a great deterioration in the seeds contained in paper packages which were stored in places having a warm, humid atmosphere, while the seeds put up in air-tight containers preserved their vitality much better under these conditions. Seeds from places having comparatively dry climates showed no appreciable loss in vitality from either the paper packages or the air-tight containers.

The Germination of Seeds as affected by Soil Temperatures: Edgar Brown.

A brief description of observations on the temperature of the upper layers of soil and the effects of soil temperatures on the germination of seeds. From March 26 to June 30 planting of twenty different kinds of seeds were made at intervals of from two to three days, and records were kept of the total germination and appearance of first sprouts.

Readings of soil thermometers at depths varying from one fourth inch to two feet and of air and solar radiation thermometers, were made from 5 A.M. to 10 P.M. at intervals of fifteen minutes. Great variations in germination resulted. Lettuce germinated well in the early part of the season when the temperature was comparatively low, but poorly later as soil became warmer. The reverse was true of corn and many other seeds.

The time between planting and the appearance of first sprouts was generally inversely proportional to the per cent. of germination. Seeds of low vitality germinate much more slowly than seeds of high vitality. Seeds of *low* vitality are much more affected by unfavorable conditions than seeds of high vitality.

The Relation of Transpiration to other Functions: Burton E. Livingston.

The subjects for study were wheat plants grown in soils and nutrient solutions. The respective amounts of water lost by transpiration during a period of two or three weeks in a synchronous series of cultures in different soils or in different solutions appeared to be a good criterion for judging the relative values of these different media. To test this more rigidly, total transpiration was compared in a large number of series with the weight of the leaves and with their area. It was found that through a wide range of treatments transpiration is proportional to leaf area. The relation of transpiration to leaf weight seems not to be quite so simple, although by this criterion the different treatments in a series would fall in the same order as by that of transpiration. In other words, transpiration per unit area is quite generally uniform

throughout a series, while that per unit weight varies slightly. The amount of variation in the last case is far too small, however, to interfere with the use of transpiration as a criterion for estimating relative leaf weight. The conclusion from these tests is simply that *soils or solutions may be compared, in respect to their power to support growth, by means of total transpiration of the plants growing therein.*

A number of studies were presented of the relation of transpiration to absorption of salts in water cultures. In a series of cultures with identical treatment excepting for the use of different solutions, transpiration (since it is proportional to area and weight of the leaves, and therefore to growth of the plant) is found to be proportional to the amounts of salts absorbed. But when one culture is grown in a moist air and another in a relatively dry one this relation fails. A moist air (such as that in a bell-jar), as is well known, checks transpiration to a marked degree. It checks absorption of salts to a very slight degree, often not at all.

Further Notes on the Physiology of Stigeoctonium: BURTON E. LIVINGSTON.

The alga is the same as that on which the author has studied the effects of external osmotic pressure, drying and the presence of cations. The three above-named conditions cause filaments to assume the palmella form. It is now found that the effect of low temperature (2° to 10° C.) is nearly identical with that of the mineral poisons. Thus the palmella form is produced from filaments but zoospores are not inhibited, although there was no stimulation of zoospores observed.

In sea-water the alga lives and grows slowly as the palmella form. In sea-water diluted with distilled water to one hundred times its volume the same response occurs, showing that, although natural sea-water has an osmotic pressure high enough to produce the change, yet there is present a poison which will produce the same effect without the physical stimulus. It is apparent from the studies on metals that this poison must be either anionic or organic in its nature.

Further, water from peat bogs, although it has no appreciable osmotic pressure, causes the alga to change from the filamentous to the palmella form. It is probable that here we are dealing with an organic substance in small quantities. The observation is of special interest in connection with the xerophytic structures of bog plants, seeming to suggest very strongly that the explanation of such structures lies in the presence in the bog water of some organic poison. The toxic property of this water is not proportional to its acidity.

The Salt Water Limits of Wild Rice: CARL S. SCOFIELD.

Wild rice (*Zizania aquatica* L.) is naturally a fresh-water plant, and abounds in streams flowing into salt water along the Atlantic coast. An investigation was made to determine the salt-water limits of the plant. Three delta regions were surveyed, and the water both inside and outside the wild rice field was tested by an electrical conductivity method. It was found that where the water surrounding the plants is more saline than the equivalent of 0.031 normal solution of sodium chloride, the growth of wild rice is nearly or quite inhibited.

Notes on the Vegetation of Onondaga Lake: J. E. KIRKWOOD.

Onondaga Lake is situated in central New York and is known chiefly through the existence of certain salt springs on its shore. These springs impart a salinity to a considerable area of the marshy lowlands about the lake and a conspicuous holophytic

vegetation has sprung up. The plants thus far observed which are characteristic of salt marshes and maritime situations are: *Ruppia maritima, Triglochin maritima, Scirpus robustus, Juncus Gerardi, Salicornia herbacea, Tissa maritima, Aster subulatus, Senecio viscosus.* Analyses of the salt soils show saturated soils to contain solutions varying in concentration from .957 per cent to 7.32 per cent. A strongly saline sample of soil bearing *Tissa, Salicornia,* etc., yielded the following figures: 20 grams of fresh soil contained 6.56 grs. water (by evaporation to constant weight in laboratory at room temperature), .479 grs. water soluble salt, 2.489 grs. acid soluble material, 1.896 grs. volatile material and residual water, and 8.576 grs. solid residue after ignition.

Spermatogenesis and Behavior of Pollen Tube in Some of the Cucurbitaceæ. J. E. KIRKWOOD.

The forms studied were *Fevillia cordifolia, Melothria pendula, Cucurbita Pepo, Micrampelis lobata, Cyclanthera explodens.*

In the organogeny of the flower, the sepals, where present, arise first, followed by the petals on an inner circle and alternating with the outer members. Stamens appear about the same time as the petals, with which they alternate in *Fevillea.* The archesporial series of cells is hypodermal in the outer angles of the anthers and divides to furnish primary tapetal and primary sporogenous cells. In *Fevillea* the latter multiply by repeated divisions to form a mass of pollen-mother-cells. Cytoplasmic phenomena in the mitosis of the pollen-mother-cells of *Micrampelis* are interesting as revealing the evolution of certain darkly staining masses, which are regarded as the extranuclear nucleoli of other writers. These appear to arise, before the dissolution of the nuclear membrane, from kinoplasmic strands of the cytoplasm.

The pollen tube, in some of the forms examined, requires about forty-six hours to reach the embryo-sac. Its course is mostly intercellular. Where starch is present in the tube it was not found in the conducting tissue and where found in the conducting tissue none appeared in the tube. Evidence points to the secretion of peptones in the one case and of sugars in the others as the directive stimulant, and to the endosperm nucleus as the center for the elaboration of such stimulant in the embryo-sac.

Fasciation of Field Peas: F. H. BLODGETT.

Carelessness in selecting seed often results in direct loss in the quality or quantity of a crop, but this loss is not always as distinctly evident as was recently the case in fields of peas grown for cannery purposes, near Baltimore. The peas in question were grown from seed secured through a feed dealer, who knew nothing apparently of their pedigree, and who could not guarantee the quality of the seed as the regular seedsmen do. The observations were made especially upon two fields of approximately fifteen acres from which no crop was harvested and probably not more than five per cent. of a crop formed. The lack of pedigree establishing good qualities on the part of seed parents was made evident in the growth of the peas early in the season.

The soil conditions were a light sandy loam abundantly enriched with city manure, upon which the large amount of moisture and high temperatures worked together to produce a very vigorous growth of vine, but which from its very vigor, was abnormal. The vine instead of setting pods became fasciated, forming tubular or flattened stems bearing large numbers of flowers at the upper end, which set practically no seed. The stems had the appearance of two tubes, the inner one tapering

downward to a point and united to the upper cylindrical portion by the common rim, along which the flower clusters were developed. The two tubes were practically free from any connection with each other, except at the end and each bore upon its exposed surface leaves and branches, the inner one, of course, in a lesser degree. Many of these branches were hollow and often somewhat flattened or fasciated.

The cultural conditions in the locality are such that the pea vines are almost a complete loss in the absence of stock to which it could be fed, the only use possible being to turn them under as green manure. The loss to the grower was total and was measured by the cash outlay, not only for the seed in the first instance but for all labor upon the field, and the maintenance of the force of pickers, for a number of days in anticipation of a possible crop. Seed of known parentage will hereafter be used in the locality where the above observations were made. F. E. LLOYD,

Secretary.

SCIENTIFIC BOOKS.

International Catalogue of Scientific Literature. First Annual Issue. N—Zoology. Part I., Author Catalogue. Part II., Subject Catalogue. London, Harrison & Sons. 1904. Pp. xvi + 1528.

This work is planned to include the zoological literature for the year 1901, although one is compelled to analyze the preface in order to determine the period covered, since no record of its extent appears on cover or title page of either part. According to information printed on the cover the manuscript of this volume was completed in August, 1903, and the printed copy is dated February, 1904, although the work seems not to have been generally distributed until some months later.

Part I. contains the general explanations with the scheme of classification and an index thereto in English; and this matter is repeated in French, German and Italian. Following these the author catalogue fills 260 pages and lists 5,918 titles. Part II., which is about three times as voluminous, contains at the close a list of journals with abbreviated titles and the topographical classification. More than 1,100 pages are filled with the subject references proper. The system used has been the subject of extended discussion in SCIENCE and calls for no further notice here. The addition to each phylum of a list of names of new genera and species will commend itself to all as a most desirable feature.

Such bibliographic work is not new in the zoological field, and several of the similar enterprises already in existence have achieved noteworthy success. The oldest of these is the *Zoological Record,* which is especially full along taxonomic lines, while the *Zoologischer Jahresbericht* manifests a confessed morphological bias. Both of these, but more especially the latter, include an analysis of the subject matter of publications cited, whereas the admirable literature lists of the *Zoologischer Anzeiger* only hint at the contents of a publication by its classification. The *Bibliographia Universalis* of the Concilium Bibliographicum forms a subject catalogue comparable directly with the publication under consideration. A comparison of this volume with the results achieved by the other agencies noted will constitute a fair test of its value to workers in zoology.

In respect to promptness in appearance the 'International Catalogue' is certainly at an abnormal disadvantage in the first year of its history; whether this is sufficient excuse for its publication from one to two years later than the same material was available through the other agencies will depend upon individual judgment. At least its belated appearance should enable it to equal the results of other bibliographies. A close approximation of titles listed gives over 6,600 for the *Zoological Record,* over 8,000 for the *Zoologischer Anzeiger* and over 8,400 for the *Concilium Bibliographicum* as against the 5,918 entries in author list of the 'International Catalogue.'

The character of the subject catalogue has been tested both topically and taxonomically. On the taxonomic side Professor Weltner, of

Berlin, has called attention in a recent article* to the treatment of the sponges, where only 27 papers are included out of 82 which appeared during the year 1901. Among those omitted are some of first importance, while even of the references given the entries under special headings are incomplete and erroneous. The reports on Porifera in the *Zoological Record* and in the *Archiv für Naturgeschichte* appeared in advance of the date given for the completion of this manuscript, and yet the latter is much less satisfactory.

He might also have added that the insufficiency of the work on Porifera goes to show governmental red tape in this enterprise and lack of real control on the part of the scientific staff, since, according to the title page, the very man stands sponsor for this volume who had already published one of the admirable bibliographies cited by Weltner as worthy of emulation.

Dr. T. Wayland Vaughan has published in SCIENCE† a comparison of the work on Cœlenterata here with the cards of the Concilium Bibliographicum, and the *Zoological Record*, He found that "the Concilium Bibliographicum procured 70 per cent. of the references, the *Zoological Record* for 1901, 63 per cent., and the 'International Catalogue' 40 per cent." "Works of importance published in practically every country are left out." Promptness in appearance was in inverse ratio to completeness.

A further analysis of the subject catalogue yielded interesting and important results for its evaluation. Under the heading 0020 'Periodicals, Reports of Institutions, Societies, Congresses, etc.,' are entered half a dozen reports of individual journeys, excerpted from publications of learned societies and certainly not appropriately classified in this subdivision, while at the same time the leading zoological journals are omitted. Furthermore, such journals as are concerned with single groups merely are entered here in some cases instead of under the fitting special heading, *e. g., Philadelphia, Pa., Students' Entomological Association,* or *International Congress of Ornithology in Paris, 1900.* In fact, the technical periodicals seem also to have fared ill in this catalogue for the leading ornithological and entomological journals do not appear in any of the lists.

Such inappropriate entries also occur among individual publications, *e. g.,* the *Sequence of Plumages & Moults* entered under general treatises, the *Reproduction of the Protozoa,* and *Entomological Field-work* cited under addresses. Open to even more serious criticism are such entries as a *Collective Investigation of Indian Culicidæ* and *Studies on Eocene Mammalia* under 0060 'Collections.' Under the same numeral the subheading 'Economics' is also inconsistently and very incompletely treated; but this is, no doubt, a difficult topic to limit precisely. The same can not be said, however, of 0070 'Nomenclature (Principles of)' in which important references are lacking, while 0090 'Technique' has a total of only 14 titles, some of which belong under microscopy or biology, whereas the real list of appropriate references under this heading can not be reduced to less than fifty or seventy-five titles, and the Concilium Bibliographicum gives 110 cards with the date 1901. It should also be noted that the titles given in the 'International Catalogue' have no claim at all to preeminent importance, for trivial items are included and weighty papers omitted. The analysis might be pursued with similar results through the other headings of the catalogue. It is evident that the work has not been done by persons at all familiar with the subject matter. This feature is strikingly shown in the omission of a paper on certain insects entitled, 'Encore quelques mots sur l'élevage des Bacilles,' although two other papers by the same author and in the same journal are duly cited. One can not help wondering whether the missing paper will turn up under botany or bacteriology!

In order to test the accuracy and completeness of the subject references for technical purposes, I chose as a topic the fauna of New Guinea and took for comparison the cards of the Concilium Bibliographicum under the same heading. There were 36 of these cards

* *Zool. Anzeiger,* July 26, 1904, Vol. 27, No. 25, p. 788.

† N. S., Vol. XIX., No. 492, p. 860.

as against 8 references in the 'International Catalogue' and one title was lacking from the cards, whereas 29 were not entered in the 'International Catalogue.' A further study of the author catalogue in the latter showed that in reality but four titles were lacking and one other was incorrectly entered. Of the titles missing from the subject catalogue six were entered under more general headings, since the bibliographer had doubtless followed the error in the titles of the papers; two were entered incorrectly under other geographic divisions, and twenty-one were not listed under any faunistic subdivisions, although seven of these gave positive evidence and two others bore some indication in the title that this region was treated. An analysis of parthenogenesis made in the same way showed nine titles wanting from the 'International Catalogue,' and from the cards only two, both of which were Russian.

A similar test was made in the subject of parasites, where the publications are sufficiently numerous, the notes and references sufficiently hidden, and the places of publication so dispersed as to test very sharply the character of any bibliographic enterprise. Twenty-four references were lacking among the cards of the Concilium Bibliographicum, ninety-three from the subject lists of the 'International Catalogue'; and of these latter forty-eight bore distinct evidence in the title that they treated of parasites of specific groups of animals.

The list of names for new genera and species constitutes, as already noted, an important and most desirable feature of the 'Catalogue.' Here the method of entry is distinctly faulty in that the type is not noted, the locality is not given, the page of first record is not entered and the original form is not cited in connection with those designated as new names. On reviewing the parasitic forms I was able to find many names of new genera and species omitted, even from the papers listed; in all were noted as wanting among Protozoa two new genera and four new species; among flatworms one new genus and eighteen new species; among Nematoda two new genera and ten new species; among parasitic Crustacea two new genera and four new species. I do not doubt that the actual number wanting is decidedly greater than the figures given.

Some tests were also made to determine the accuracy of the work, both in citation and in the elaboration of the material used. In addition to such as are evident mistakes in printing, there is the usual number of errors of a purely mechanical type, such as reversing the names in a paper of joint authorship, entering papers by two authors of somewhat similar name under a single heading, or ascribing publications to a different author of the same family name. In some instances also papers are included which, according to other authorities, fall within 1900 or 1902. In the one instance, which could be checked here, the 'International Catalogue' is apparently in error. Even in work done by our own countrymen one finds the Washington Academy of Sciences referred to as the National Academy.

As regards accuracy in handling the material treated, I have to record without further comment the chance discovery that among the papers in the *Quarterly Journal of Microscopical Science* two in the March (1901) number are omitted and also two in the May (1901) number. A more extensive test could not be made for lack of time; yet missing titles were noted from several prominent journals.

A lack of uniformity in treatment is very noticeable in the work done by different nations. Thus the English bibliographers have entered chapters in text-books under special headings and also reviews of various articles. Had this been done by other nations it would have added largely. Very likely some such references should be included, and that when they contain valuable critical matter by some specialist on the group under consideration; but it is equally patent that only such a specialist can pass upon the value of such items. From the standpoint of a bibliographer the treatment of these matters must be uniform. The lack of uniformity is further shown by the inclusion of a single article on *Bacillus icteroides* which probably

owed its selection to the occurrence in the title of the phrase 'cold-blooded animals.'

It would require undue space to demonstrate here what the individual observer can easily verify, namely, that there are characteristic differences in the method of treatment given the material by different national bureaus. Some have clearly over indexed, others have been as distinctly deficient. Among German references it was difficult to find errors in classification, while among those of some other nations they were all too frequent.

As a result of a most careful study of this work one is forced to conclude:

1. With respect to promptness, completeness and accuracy the results are distinctly inferior to those already achieved for zoology by several bibliographic agencies.

2. A subsidy for any one of the existing agencies equal to a fraction of the amount spent on this part of the 'International Catalogue' would yield much greater results in giving the investigator actual control of the literature in zoology.

3. The effort to construct a bibliography from materials furnished by numerous national bureaus will not result in the production of a consistent work.

4. A useful bibliography in this field can not be prepared by mere cataloguers, however expert they may be, and however great the means at their disposal for the prosecution of the work.

5. The contention of Weltner and others is abundantly justified that only the specialist in zoology can make a satisfactory analysis of zoological publications, and only he should be allowed to control such work.

6. It is most important to add to the mere record of titles a brief critical annotation regarding the subject matter of each paper. Additional subsidies should be devoted to the improvement of existing agencies rather than to the creation of new organizations.

Henry B. Ward.

University of Nebraska.

SCIENTIFIC JOURNALS AND ARTICLES.

The Museums Journal of Great Britain for December has an excellent article 'On Colors in Museums,' by Hans Dedekam, dealing at some length with the question of what are the best colors for backgrounds for various exhibits. The balance of the number is devoted to reviews and notes, and includes a good review of Dr. Meyer's recent memoir.

The contents of the January number of the *American Journal of Mathematics* is as follows:

'Some Properties of a Generalized Hypergeometric Function,' by F. H. Jackson.

'Relation between Real and Complex Groups with Respect to their Structure and Continuity,' by Dr. S. E. Slocum.

'Determination of all the Characteristic Subgroups of any Abelian Group,' by G. A. Miller.

'Collineations whose Characteristic Determinants have Linear Elementary Divisors with an Application to Quadratic Forms,' by A. B. Coble.

'Concerning Certain Elliptic Modular Functions of Square Rank,' by John A. Miller.

'Minors of Axi-symmetric Determinants,' by E. J. Nanson.

'On the Forms of Sextic Scrolls having a Rectilinear Directrix,' by Virgil Snyder.

SOCIETIES AND ACADEMIES.

THE NEW YORK SECTION OF THE AMERICAN CHEMICAL SOCIETY.

A regular meeting of the New York Section of the American Chemical Society was held at the Chemists' Club, Friday night, December 9. The following councilors were elected from the New York Section: Messrs. Leo Baekeland, F. D. Dodge, T. J. Parker, W. J. Schieffelin and Hugo Schweitzer.

The regular program of the evening was then taken up and the following papers presented:

The Art of Sizing Paper with Rosin Soaps. Martin L. Griffin.

The subject is introduced by some general considerations pertaining to sizing paper, but deals principally with the claims frequently made, that acid or free rosin sizes are most desired, and that it is the free rosin that is the effective sizing agent in paper.

The author has made a large number of experiments, sizing paper stock in different ways with different reagents, showing conclusively that this is not the case, that free rosin

is a poor sizing agent, and that the base of the precipitating agent plays a very important part in sizing paper. Incidentally he shows that any reagent whose base is alkaline will not effectually size paper, no matter how completely the rosin may be precipitated in combination with it.

The Tensile Strength of Bronzes. WILDER D. BANCROFT.

The tensile strength of the copper-tin bronzes containing more than 92 per cent. copper varies relatively little with the different heat treatments. With bronzes containing 75 to 92 per cent. copper the strength is much greater if the alloy is quenched from above 500° than if it is quenched from below 500°. The extreme effect is to be found with the 79 per cent. bronze, which has a tensile strength of over 70,000 pounds per square inch if quenched from low red heat and a strength of only about 30,000 pounds per square inch if quenched from 400°. Similar results were obtained with the ductility measurements, though the maximum ductility does not occur at the same concentration as the maximum strength. The bronze containing 90 per cent. copper gives a 40 per cent. elongation if quenched from 540°, and only a 10 per cent. elongation as cast. This work has been made possible by a grant from the Carnegie Institution.

The Production and Modern Uses of Carbonic Acid. JOHN C. MINOR, JR.

The paper describes the causes leading to the development of the carbonic acid industry, taking up the different methods of production, viz., calcination, acid treatment of carbonate, fermentation, the coke process, and the method used at Saratoga Springs for securing CO_2 from the natural mineral waters there. The treatment of the gas after production and the cylinders for holding it under high pressure are discussed. Among the commercial uses for CO_2 described at some length are mentioned: the manufacture of carbonated beverages, the extinguishing of fires on shipboard, the drawing of beer, the use in breweries for replacing the secondary fermentation, refrigeration, the operation of block signals, and the extraction of logwood. The therapeutic uses of CO_2 are also indicated.

F. H. POUGH,
Secretary.

THE TORREY BOTANICAL CLUB.

THE regular meeting of the club was held December 13 at the College of Pharmacy, Dr. H. H. Rusby in the chair, eleven members present.

The first paper on the program was by Professor F. E. Lloyd, who spoke of the Desert Botanical Laboratory at Tucson, Ariz. He pointed out that there were four characteristic types of desert visible with great regularity from the car window westward from El Paso, as the train passed from mesa to hill country or *vice versa.*

The character plants of these four deserts, which are remarkably distinct and pure, are the *Yucca, Ephedra, Mesquite, Parkinsonia* and *Fouquieria* in abundance. Professor Lloyd spoke in some detail of the vegetation in the vicinity of Tucson, illustrating his remarks with numerous excellent photographs, including several good pictures of *Cereus giganteus* in bloom and in fruit.

It was remarked that the plants with motile leaves, such as *Cassia, Acacia* and *Parkinsonia,* all faced the sun at sunrise, but did not follow its course during the day. *Fouquieria* was described in detail, attention being called to its short-lived primary leaves and curious spines, which were cited as an example of direct metamorphosis, the rosettes of secondary leaves appearing in the axils of the latter.

The primary object of Professor Lloyd's stay at the laboratory was the determination of the relation between stomatal action and transpiration. Numerous experiments were made, the results of which are to be reported in detail later.

The second paper, by George V. Nash, was on the vegetation of Inagua. Mr. Nash recently spent four weeks in collecting there. Inagua includes a large and a small island located some sixty miles northeast of Cuba, and with a total area of between five and six hundred square miles of mostly low land, the

highest point reaching only 132 feet above the sea.

The flora is poor, embracing some 350 or 400 species, the relatively numerous cacti in the genera *Opuntia, Cactus, Melocactus* and *Pilocereus* emphasizing the desert-like conditions prevailing on the islands. Five plant areas were differentiated: (1) That of the strand; (2) the scrub, where nearly all the endemic species of the islands have been found; (3) the white sand or white land, as it is called locally, characterized by a species of *Coccothrinax;* (4) the salinas, characterized by the shrub *Avicennia nitida* Jacq., and (5) the savannas, where *Conocarpus sericea* Forst. is the characteristic shrub and *Sporobolus virginicus* the common grass. In the numerous salt holes is found the only fern of the islands, *Acrostichum aureum.*

Excellent photographs were exhibited showing the dwarfing effect of the sharp winds of the southern coast, where the vegetation, elsewhere six or eight feet tall, is reduced to a foot or two in height and becomes widely spreading.

One of the results of Mr. Nash's trip was the extension of the range of *Pseudophœnix sargentii* about 350 miles to the southward; another the collection of a number of new species.

Numerous photographs, and specimens from each of the plant areas, illustrated the speakers' various points.

Edward W. Berry,
Secretary.

THE SCIENCE CLUB OF NORTHWESTERN UNIVERSITY.

The Science Club of Northwestern University held its regular monthly meeting Friday evening, January 6, 1905.

The program was furnished by the department of mathematics of the university, Dr. W. M. Strong, of Chicago, presenting a paper on 'Some Points of Interest in Mortality Tables.'

Floyd Field,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE EPIDIASCOPE.

To the Editor of Science: With reference to Professor Todd's query in the last issue of Science, 'Who saw the Epidiascope at St. Louis?' I am happy to say that the apparatus has recently been installed in the anatomical laboratory of Brown University, a much appreciated gift from physicians of Providence and other cities. I had an opportunity of seeing the epidiascope in operation at Jena in 1903 through the usual courtesy of the Carl Zeiss management.

In actual use in the laboratory it surpasses expectations both in respect to convenience in handling and to range of capabilities. Lantern slides or other transparent objects up to about twelve inches in diameter and microscopic slides are projected with good effect. The new feature which especially distinguishes the apparatus—the projection of opaque objects—is of course the most remarkable. In this as in other respects we find that the claims put forth in the prospectus are, indeed, very modest. The color, texture, motion and third dimension of objects are beautifully reproduced. Colored lithographs in bound periodicals or reprints may simply be placed upon the carrier of the machine while the book is held open with the hand, and the whole page appears with the colors and lines of the figures perfectly reproduced. It is a great advantage that the image is not reversed. A manuscript or page of text can be read from the screen directly. Original water color or oil paintings are reproduced altogether too faithfully, for the effect is that received when standing close to the picture. Insects of various kinds have been tried; they lose nothing in the reproduction. The metallic luster and iridescence of the beetles show better because of the brilliant light than when viewed directly. On the other hand, moths or butterflies with bright colors and soft texture appear with as much naturalness as do the beetles. Such natural objects of course do not suffer from the magnification of details. A small adder and a newt when placed on the carrier appear on the screen as a boa constrictor and a giant salamander. Embryos or dissected

specimens in water or in alcohol give good images. A pithed frog, cut open, shows the beating of the heart and the peristaltic movements. Furthermore, the demonstrator can not only point to the parts on the object itself, but can further separate the organs with the forceps and each movement may be distinctly observed by all in the room.

It is obvious that the apparatus is of the highest value in demonstrating before an audience a great variety of solid or opaque objects which could not be shown by lantern slides even were the time and money for preparing them available.

A. D. MEAD.

ANATOMICAL LABORATORY,
BROWN UNIVERSITY,
January 10, 1905.

QUOTATIONS.

ANOTHER CANCER SERUM.

THE newspapers last week reported, with scare heads, photographs, photomicrographs, and editorial comments, a new cancer discovery from the Gratwick Pathological Laboratory at Buffalo. It is asserted that a number of cures of cancer in mice have been effected by means of a serum prepared at the laboratory and the hope is suggested that the treatment will be equally efficacious in man. According to the New York *Herald* the cancerous mice used for the experiments were obtained from Professor Jensen of Copenhagen. They survived the Atlantic voyage, but expired between here and Buffalo. The cadavera were preserved and inoculations from one of them 'took' on several live mice, and by repeated transplantation a large number of the animals with cancer became available for further experimentation. Many of these mice recovered spontaneously, and the experimenters conceived the idea that this fortunate result was brought about by the elaboration of an antitoxin. Having in mind the possibility of a successful serum treatment of cancer, they conducted a series of experiments which they think have proved beyond question that the blood of mice which have recovered from cancer possesses an antitoxic quality. This blood, when injected into mice suffering with cancer, arrested the growth, and when the tumors were not too large caused their disappearance.

We have no reason to doubt the accuracy of the observation of the workers at the Buffalo laboratory as regards the fact of the disappearance of the tumors in mice treated with serum, and we earnestly hope they may be able to develop their discovery so that it may become applicable to man. But the plans of mice and men are proverbially uncertain in their outcome, and it is deplorable that the secular press should have prematurely reported these incomplete results. Even if the highest hopes of the experimenters are eventually realized the announcement of their discovery at this time can but do much harm by inducing many present sufferers to cast away the plank of surgical excision to grasp at what is yet but the straw of serum therapy. Schmidt, Doyen, Adamkiewicz and others whose names we have forgotten have elaborated antitoxic cancer sera, and they have failed to cure. This, of course, is no argument against the possibility of the Buffalo serum being efficacious, but in a matter of such momentous importance to mankind it behooves one to proceed with extreme caution and not to ignore the lessons of the past and the present even while dreaming of a glorious future. Many mountains have been in labor at various times, but, alas, many little white mice have been born.—*New York Medical Record.*

SPECIAL ARTICLES.

A MODEL ILLUSTRATING HITTORF'S THEORY OF THE MIGRATION VELOCITIES OF IONS.

As an aid in explaining the conception of Hittorf* the model shown in Fig. 1 has been found so satisfactory that a brief description is here given in the hope that it may be of service to those teaching the mechanism of electrolysis.

Upon a base-board, 50 cm. $\times$ 7 cm., two upright supports, *FF* (3 cm. $\times$ 1 cm. — 15 cm.), are fastened. Through these supports pass two cylindrical wooden rods, *EE*, 6 mm. in diameter and 47 cm. long. Upon these

* *Pogg. Ann.*, 89, 177; 98, 1; 103, 1; 106, 337, 513.

rods are placed sixteen wooden balls, eight on each rod as shown in the sketch. Across the top of the supports is fastened the horizontal scale, *SS*. This scale is divided into sixteen equal parts, the value of each division being the same as the diameter of a ball, or 28 mm. Between the third and fourth divisions, and between the twelfth and thirteenth divisions are placed two light strips of wood as shown at *BB* and *CC*. From the eighth division to the base-board is stretched a vertical wire, *DD*, 1 mm. in diameter. The upper row of balls are painted black and are chosen to represent kations; the lower row are painted white and represent anions. The strip *BB* is painted black, representing the kathode, and the strip *CC* is painted white, representing the anode. The wire *DD* represents the trace of an imaginary plane of reference through the solution.

With this arrangement it is possible to demonstrate to a class Hittorf's theory as explained by Ostwald.*

* 'Lehrb. d. Allg. Chem.,' II., 595.

To make its use clearer let us take a concrete case. Suppose the anion of the electrolyte to have a velocity twice as great as the velocity of the kation. Placing the balls as shown in Fig. 1 with the wire *DD* bisecting the two rows, we move the middle of the lower row, the anions, from division 8 to division 10. We then move the upper row from division 8 to division 7. We have thus imparted a velocity to the anions twice as great as that imparted to the kations. Now let three molecules discharge, the ions assuming the atomic or molecular condition. To represent this we move the three end ions beyond the electrodes *BB* and *CC*, when we have the condition represented in Fig. 2. It is obvious that the ratio of the kathode loss to the total number of molecules electrolyzed is 2:3, and the ratio of the anode loss to the total number of molecules electrolyzed is 1:3. These two values bear the same relation to each other as the velocities of anion and kation.

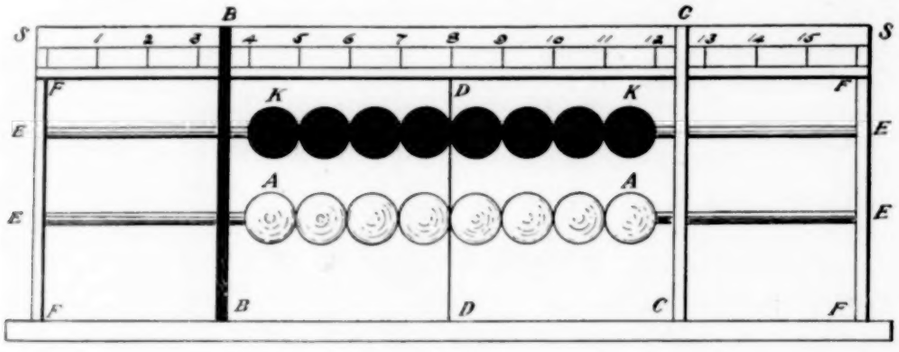

Fig. 1.

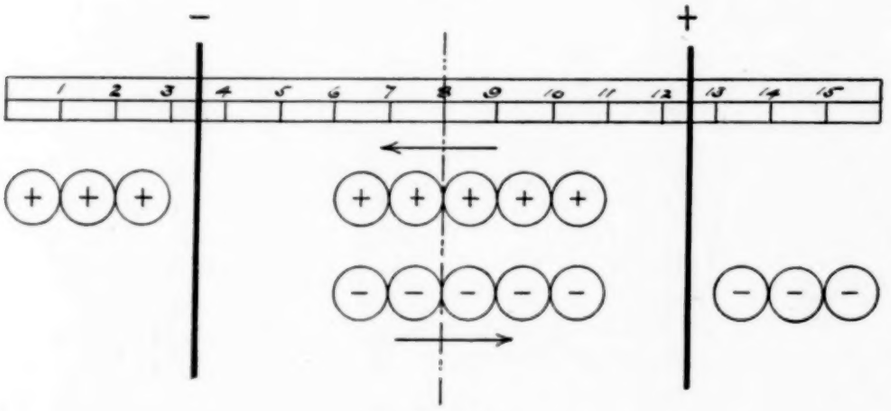

Fig. 2.

By varying the conditions it is possible to

illustrate in a very satisfactory manner the mode of ion transference.

FREDERICK H. GETMAN.
COLLEGE OF THE CITY OF NEW YORK.

*THE GEORGE WASHINGTON UNIVERSITY AND THE GEORGE WASHINGTON MEMORIAL ASSOCIATION.**

THE annual meeting of the George Washington Memorial Association was held at Rauscher's on Wednesday, December 14. The president, Mrs. Archibald Hopkins, opened the meeting with an address recalling the events of the year, dwelling especially on the agreements of the association with the Columbian University, whereby the university changed its name from Columbian to the George Washington University and the association pledged itself to raise the sum of $500,000 to construct the central building of the proposed new university group in Van Ness Park. This building, the administration building of the university, was to receive the name of 'The George Washington Memorial Building.' The president laid stress upon the need in Washington of such a building, which should contain an auditorium for meetings of international tribunals and of scientific organizations.

The executive committees of the university and of the George Washington Memorial Association have already designated the architects who were to compete for the memorial building. The park commissioner, the committee for Greater Washington, Mr. McKim, Mr. St. Gaudens, Mr. Olmstead, and Mr. Burnam, with whom is associated Mr. Bernard R. Green, have consented to act as jury of award, and the date of the competition will be fixed as soon as the program, which was being prepared by Professor Percy Ash, of the university, should be finished and submitted to the jury.

The most vital problem, therefore, which the association had to solve was the raising of funds for the Memorial Building. Fifty thousand dollars were already in the possession of the association, and the association desired to raise fifty thousand more before March, 1905, so that the building could then proceed.

The president felt justified in saying that the outlook was most encouraging. The enthusiasm of California and of Utah had been rekindled by the recent visits of Dr. Needham; in Ohio and South Dakota interest was reviving, and Virginia, Maryland, Pennsylvania and New York were organizing meetings to be held in January and February. Meanwhile, literature was being prepared, plans carefully considered and state organizations perfected. All was as yet tentative; yet, in view of the work of the past year, the evident reawakening of interest, and the hearty cooperation of the George Washington University, the future of the George Washington Memorial Association seemed to be full of promise. The president then called upon Dr. Needham.

In his address Dr. Needham laid especial emphasis on the national and scientific character of the governing board of the George Washington University, and gave a brief sketch of the organization of the university, which had in view primarily graduate and professional studies, but grouped about this higher university work, as feeder to it, the organization provides for a number of independent colleges for undergraduate students, governed by their own distinctive boards. The first of those, Columbian College, which embraced all the undergraduate work now being done in the university, has now 401 students, this organization combining the essential features of the English idea, of Oxford and of Cambridge, with the American idea of a university.

Dr. Walcott congratulated the association upon the firm relations established during the past year with the George Washington University. Some fear, he continued, had been entertained that the Carnegie Institution, established for scientific research and for graduate work, would materially interfere with the prosperity of the university. This apprehension, however, had been removed, for, by the election of Dr. Woodward as its president, the Carnegie Institution definitely limited its sphere purely to scientific research. The committee on nominations having presented the names of the officers of 1903–04 for re-election,

* From the *Bulletin* of the University.

these officers were unanimously re-elected by the association for the year 1904–05.

*PORTO RICO EXPERIMENT STATION.**

The work of the Porto Rico experiment station has been considerably enlarged during the past year, partly with the aid of an appropriation of $2,700 made by the insular legislature and nearly $1,200 received from the sale of farm products.

Many permanent improvements have been made on the station farm. A small tile machine was purchased and drain pipes were manufactured on the farm. Practically all the river bottom or alluvial land on the station farm has been drained. This is the first under-drainage ever undertaken in Porto Rico, and it is believed that it will not only greatly enhance the producing power of the station property, but will also serve as a valuable object lesson to the planters of the island. An experimental irrigation system has also been installed on this farm.

A preliminary survey of the principal tobacco districts of the island has been made by a tobacco specialist in the employ of the station, and a report on these investigations is being prepared.

The investigations on different methods of pruning, shading and fertilizing coffee plants have been continued. In an attempt to exterminate the coffee-leaf miner by hand picking the leaves proved the impracticability of this method of repressing this pest. The entomologist of the station has also been investigating the possibility of combating this insect by means of parasites, and reports the discovery of an effective parasite which, it is believed, by careful propagation and distribution, will aid very materially in keeping in check this insect, which is by far the most serious enemy to coffee cultivation now upon the island.

A special study of the diseases of coffee and other plants was made by the botanist of the Connecticut State experiment station, who was temporarily in the employ of the Porto Rico station.

* From the Report of the Secretary of Agriculture.

Much attention is being given to the propagation of citrous fruits, especially with a view of obtaining better stock for growing in the orchards of Porto Rico. A bulletin on the methods of production and marketing of oranges, with special reference to Porto Rico conditions, has recently been issued. A large number of tropical fruits, including mango, alligator pear, soursop, nispero, guava and many others, have been brought together in a tropical fruit orchard.

The tea, rubber and cacao plantations mentioned in my last report are flourishing and are being extended. Among the tropical vegetables which enter into the variety tests are the yautia, taro, edible canna, arrowroot, cassava, yams and sweet potatoes, all of which have thus far done well.

Experiments are being carried on with a number of fiber plants. Among these maguey and sisal have thus far given very promising results. The station has thus far conducted no careful experiments with cotton, but the industry has been extended throughout the island to a considerable extent during the past year, and the station officers report that the results seem to indicate that it is possible to profitably produce a medium grade of Sea Island cotton in Porto Rico.

The report of the Bureau of Soils on the soil survey from Arecibo to Ponce, made by that bureau in cooperation with the Porto Rico station, has been reprinted in both English and Spanish for distribution on the island. Several other bulletins and circulars in both languages have been issued during the year.

EIGHTEENTH SESSION OF THE MARINE BIOLOGICAL LABORATORY, 1905.

The eighteenth season of the Marine Biological Laboratory opens under favorable auspices. For the first time the laboratory is in a position to welcome investigators at any season of the year; a large stone building has been purchased and equipped with heating apparatus, running fresh and salt water, and the usual laboratory supplies. Two private rooms for investigators have been furnished in this building and are ready for occupancy. Mr. Gray, curator of the supply department,

and two assistants are in residence throughout the year and are prepared to furnish material and supplies to investigators. Naturalists who wish to carry on research in the winter and spring at Woods Hole should apply for accommodations to the director of the Marine Biological Laboratory, Professor C. O. Whitman, or to the assistant director, Professor Frank R. Lillie, University of Chicago, Ill. The regular season for investigators opens in June when the summer laboratories will be ready for occupancy.

The Carnegie Institution has subscribed for twenty rooms for the season of 1905. Applicants for the use of these rooms should address the president of the Carnegie Institution, Washington, D. C., stating the general character of the work they propose to do, and the period for which the room is desired. Applications should be made as early as possible, as the rooms are generally all in use during July and August. Thirty-five other private rooms are reserved for investigators. Applications for these rooms should state the time of desired occupancy and any special needs, and should be sent to the director before May 1. All private rooms are supplied with reagents, glassware, etc., and carry with them the usual privileges in regard to supplies and aquaria and assistance in collecting material.

The regular session for students will begin on Wednesday, June 28, and will continue for six weeks. Courses in invertebrate zoology, in the life histories of marine animals, in physiology and in botany are offered. The annual announcement for 1905 will be ready on or before March 1, and may be procured from Professor Frank R. Lillie, the University of Chicago, Ill.

SCIENTIFIC NOTES AND NEWS.

PROFESSOR RAPHAEL PUMPELLY was elected president of the Geological Society of America at the recent Philadelphia meeting.

THE officers of the American Anthropological Association for the ensuing year are: *President,* Professor Frederic W. Putnam, of Harvard University; *Secretary,* Mr. George Grant MacCurdy, of Yale University; *Treasurer,* Mr. B. T. B. Hyde, of New York; *Editor,* Mr. F. W. Hodge, of the Smithsonian Institution.

THE annual meeting of the National Geographic Society was held at Washington on January 13. Eight members of the board of managers were elected to serve for three years as follows: Alexander Graham Bell, Alfred H. Brooks, Henry Gannett, General A. W. Greely, Gilbert H. Grosvenor, Angelo Heilprin, O. H. Tittmann and General John M. Wilson. The report of the secretary, Hon. O. P. Austin, showed that the present membership of the society is 3,400, of whom 1,125 are residents of Washington and 2,275 distributed throughout the United States, Alaska, Philippines, Europe, Asia and Africa. The net gain in membership for 1904 was 789. During 1904 the society held twelve scientific meetings, sixteen special meetings, and four field meetings.

PROFESSOR E. WARBURG, director of the physical laboratory of the University of Berlin, has been appointed president of the Reichsanstalt.

DR. LIVINGSTON FARRAND, professor of anthropology at Columbia University, has been placed in charge of the work of the National Association for the Study and Prevention of Tuberculosis.

DR. MILTON J. GREENMAN, assistant director of the Wistar Institute of Anatomy and Biology of the University of Pennsylvania, has been elected director to succeed Dr. Horace Jayne.

THE Russian Geographical Society has conferred its Count Lüthe medal on Sir John Murray.

PROFESSOR WILLIAM H. BURR and Mr. William Barclay Parsons, members of the Isthmian Canal Commission, have sailed for Panama on the steamer *Orizaba.*

DR. CHARLES M. CHILD, of the department of zoology of the University of Chicago, is spending the winter quarter in research at Hopkins Seaside Laboratory of Stanford University, Pacific Grove, Cal., and at the San Diego Laboratory of the University of California.

Dr. G. R. Parkin has returned to superintend the election of Rhodes scholars for 1905 throughout the United States and Canada.

Professor Boyce and the members of the malarial expedition who left Liverpool for West Africa some time ago are returning on a steamer, which left Sierra Leone on January 8 for Liverpool.

Professor Friedrich Brauer, director of the Zoological Department of the Natural History Museum at Vienna, and Professor T. H. Fuchs, director of the Geological and Paleontological Department, have retired.

At a meeting of the Institution of Civil Engineers, on January 10, Sir William White gave an account of the visit paid to the United States and Canada by the institution last year during his term of office as president.

A conference on school hygiene has been arranged by the Royal Sanitary Institute to be held under the presidentship of Sir Arthur Rücker in the University of London from February 7 to 10.

Dr. Westbrook, of Minneapolis, was elected president of the American Public Health Association at the recent Havana meeting.

Dr. Hans H. Meyer, professor of pharmacology in the University of Vienna, has accepted an invitation to deliver the second course of Herter lectures at the Johns Hopkins Medical School next October.

Mr. Joseph Chamberlain will preside at the banquet of the Liverpool School of Tropical Medicine to be held on May 10.

Dr. L. Courvoisier, assistant in the observatory near Heidelberg, has been appointed observer in the Royal Observatory at Berlin.

The deaths are announced of Dr. Carl Otto Weber, an authority on the chemistry of india-rubber; of Mr. George H. Harris, an agent of the Division of Entomology, U. S. Department of Agriculture; of E. G. T. Lueder, a botanist, and of Professor Frank A. Leach, a teacher of science.

The deaths are reported of Dr. Anton Müttrich, professor of physics at the School of Forestry at Eberswalde, at the age of seventy-one years, and of Dr. Jacob Walz, professor of botany at Odessa, at the age of sixty-three years.

We learn from *Nature* of the deaths of Mr. G. W. Hemming, a mathematician, at the age of eighty-four years, and of Mr. Robert Harris Valpy, geologist, at the age of eighty-five years.

The French government has recommended an appropriation of $200,000 for the International Congress of Tuberculosis to be held shortly in Paris.

The third International Congress of Philosophy will be held at Heidelberg in 1908.

An International Association of Anatomists will be established at a meeting to be held at Geneva from August 7 to 10 of the present year. The initiative has been taken by the anatomists of the Swiss universities and has the support of the anatomical societies of Germany, Great Britain, France, Italy and America.

The German Astronomical Society offers a prize of 1,000 Marks for the most exact calculation of the next appearance of Halley's comet. The paper may be written in English and need not be presented until the end of the year 1908.

The Henry Saxon Snell prize was founded to encourage improvements in the construction or adaptation of sanitary appliances, and is to be awarded by the council of the Royal Sanitary Institute at intervals of three years, the funds being provided by the legacy left by the late Mr. Henry Saxon Snell. The first prize, which will consist of £50 and a medal of the institute, is offered in the year 1905 for an essay on 'Domestic sanitary appliances, with suggestions for their improvement.'

The U. S. Civil Service Commission announces examinations on January 30 for positions under the Isthmian Canal Commission, including those of assistant civil engineer at salaries of $200, $225 and $250 per month.

According to *Terrestrial Magnetism and Atmospheric Electricity*, the efforts of Professors Beattie and Morrison towards securing magnetic data in South Africa are receiving adequate recognition. The magnetic survey was

originally started by them in the summer of 1897–8 at their own expense. Since then grants have been received from various sources and assistance has been rendered by various organizations and persons. The work has been zealously prosecuted so that there are now 362 stations distributed over Cape Colony, Transvaal, Orange River Colony, Natal and Rhodesia. There still remained, however, the northwest of Cape Colony and for the completion of this work the Cape government voted for the current year £200 and the Royal Society of London £250.

THE library of the American Museum of Natural History has been given the private scientific library of Professor H. C. Bumpus, the director of the museum, amounting to more than three hundred volumes and twenty-seven hundred pamphlets. This collection is especially rich in works in comparative anatomy and brings to the library many valuable works and rare reprints not heretofore owned by the museum.

MEDICAL papers state that with the advance of the cold weather, plague is again growing worse in Upper India. For the week ending December 3 the United Provinces had 4,425 deaths, an increase of 1,000 on the total of the previous week; the Punjaub, 2,446, an increase of 400; Mysore, 1,157, an increase of nearly 600; Hyderabad State, 768, an increase of 200. In the Bombay Presidency there were 6,770 deaths, an increase of 300. Elsewhere throughout India the disease remains about as before.

AT Cornell University, January 17, before the conference or seminary of the department of neurology and vertebrate zoology, Mr. A. H. Wright, '04, gave an account of his collections and observations as to the fish fauna of Monroe County during the past two summers. Notwithstanding a previous survey, Mr. Wright has added eight species to the seventy-four already known from the Ontario basin, and thirty-two to the forty-two previously recorded for Munroe County. There was shown a combined table and diagram exhibiting, for a single creek eleven miles long, the varying conditions, mile by mile, as to the depth of the water, the contour and nature of the bottom, the rapidity of the current, and the range of the twenty-six species found in it. It appeared that in a given stream the lower, more sluggish and muddy portions are frequented by the larger and less active fish, while the smaller and more active live in the upper portions where the current is swifter and the bottom gravel or sand.

MR. MORRIS K. JESUP, president of the Peary Arctic Club, by order of the board of directors, has issued the following appeal for funds to aid in the equipment of the new expedition which is to start under command of Commander Peary next summer:

There is an opportunity, offering strong probabilities of success, of securing for the country and this city, the honor and enduring fame of accomplishing a work of large and world-wide interest and value.

The Peary Arctic Club has been incorporated under the laws of the State of New York, for the purpose of aiding Commander Peary in his persistent efforts to complete the geographical conquest of the large unknown area of the North Polar basin, and secure for this country, if possible, the honor of attaining the extreme top of the earth.

The club has had subscribed, principally from its own membership, about $55,000, and, in order to avoid delay which would be fatal, has assumed the responsibility of contracting for, and is now building, a special ship of exceptional strength and powerful engines, to be completed about March 1, 1905.

This ship is the first ever constructed in this country for Arctic discovery.

Additional funds to the amount of $100,000 are necessary for the completion of the ship and equipment of the expedition, and it is not believed that the public-spirited men of means in this great country, and particularly this city, from which the expedition will start, will permit so broad and laudable an enterprise to fail for lack of so comparatively small an amount of money. The club cordially invites your cooperation in this enterprise, and hopes that you will contribute to the funds needed. Subscriptions for any amount will be gladly received.

Very respectfully,

MORRIS K. JESUP,
President Peary Arctic Club.

The American Forest Congress, which met at Washington from January 2 to 6, passed resolutions as follows: Urging on Congress and all legislative bodies full protection and preservation of the forest, especially protection from fire; advising reduction of taxation on lands held for forest reproduction, so as to induce forest conservation; urging the repeal of the timber and stone act; advising the guarded sale of timber growing on public lands; favoring in case of lieu land selections an exchange for lands of equivalent value or of similar condition of forest growth; advocating the immediate consolidation of all government forest work, including the administration of the National Forest Reserves, in the Department of Agriculture; favoring the passage of a law which will authorize the sale of all non-mineral products of the forest reserves, the proceeds to be applied to the management and protection of the reserves and to road and trail construction within them; that Congress appropriate adequate sums for the promotion of forest education and experiment work in all agricultural colleges and experiment stations in the United States; that opportunities be increased for general forest education in schools and colleges, and for professional training in post-graduate schools; urging the establishment of national forest reserves in the Southern Appalachians and in the White Mountains; that Congress declare forfeited all right-of-way permits not exercised promptly on issuance, and secure to all industries engaged in lawful business and which will promptly use their permits, the possession of necessary rights of way similar to those of railroads and irrigation companies, reasonable payment to be exacted for the use of rights of way on forest reserves and other public lands; that all state legislatures provide laws and financial aid to consolidate the rural schools in units sufficiently large that forestry, agriculture and home economics may be successfully taught by precept, example and practical work; and protesting against the attempted reduction of the area of the Minnesota National Forest Reserve.

UNIVERSITY AND EDUCATIONAL NEWS.

Mr. Hiram W. Sibley, of Rochester, has given $5,000 to Hobart College.

By the will of the late W. H. Baldwin, Jr., Harvard University receives $2,000 and Tuskegee Normal Industrial Institute $1,000.

A Chinese viceroy has provided five scholarships for Chinese students at the University of California.

McGill University, Montreal, received during 1904 from a friend resident in the United States renewal of his donation of $400 for a fellowship in electricity.

The University of Missouri has issued a bulletin showing the growth of the university from December 31, 1890, to December 31, 1903. The statistical summary is as follows:

	1890.	1903.
Seminary fund (endowment)	$540,000	$1,240,000
From U. S. Government (yearly)	$29,150	$38,438
Annual income (for all purposes)	$122,255	$479,835
Buildings, books, and equipment	$360,000	$1,600,000
Students enrolled	510	1,649
Professors, Assistant Professors, and Instructors	38	100

Dr. James B. Angell, president of the University of Michigan, has presented his resignation to the regents of the university, but they have unanimously declined to accept it and offer to supply him with such assistance as he may need. Dr. Angell, celebrated his seventy-sixth birthday on January 7.

Dr. Paul L. Serrel has been appointed to an assistant professorship of mathematics at the College of the City of New York.

Professor G. Bodländer, of the Technological Institute of Brunswick, has been called to the chair of physical chemistry at Göttingen, vacant by the removal of Professor Nernst to Berlin.

Professor Joseph Partsch, professor of geography at Breslau, has been called to Leipzig.

Dr. Emil Wiechert has been promoted to a professorship of geophysics at Göttingen.